FINAL REPORT

LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS FORT LEONARD WOOD, MISSOURI

ENERGY ENGINEERING ANALYSIS PROGRAM (EEAP)

Prepared for

DISTRIBUTION STATEMENT A
Approved for public release
Distribution Unlimited

U.S. Army Corps of Engineers
Kansas City District
Kansas City, Missouri

Under

U.S. Army Engineer District, Mobile
Indefinite Delivery A-E Contract
Contract No. DACA01-94-D-0033
Delivery Order 0009
EMC No. 1406-011

May 1996

19971022 147

By

E M C Engineers, Inc.
2750 S. Wadsworth, Suite C-200
Denver, Colorado 80227
303/988-2951

DTIC QUALITY INSPECTED 3

DEPARTMENT OF THE ARMY
CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS
P.O. BOX 9005
CHAMPAIGN, ILLINOIS 61826-9005

REPLY TO
ATTENTION OF: TR-I Library

17 Sep 1997

Based on SOW, these Energy Studies are unclassified/unlimited.
Distribution A. Approved for public release.

Marie Wakefield,
Librarian Engineering

This report has been prepared at the request of the client, and the observations, conclusions, and recommendations contained herein constitute the opinions of E M C Engineers, Inc. In preparing this report, EMC has relied on some information supplied by the client, the client's employees, and others which we gratefully acknowledge. Because no warranties were given with this source of information, E M C Engineers, Inc. cannot make certification or give assurances except as explicitly defined in this report.

TABLE OF CONTENTS

List of Tables ..... *v*
List of Abbreviations ..... *vi*

EXECUTIVE SUMMARY 1

1. INTRODUCTION 1-1

1.1 AUTHORITY FOR STUDY 1-1

1.2 PURPOSE OF STUDY 1-1

1.3 SCOPE OF WORK 1-1

1.4 APPROACH 1-1

1.5 ORGANIZATION OF REPORT 1-4

2. FACILITY DATA 2-1

2.1 GENERAL 2-1

2.2 ENERGY SOURCES AND CONSUMPTION 2-1
2.2.1 Electricity 2-1
2.2.2 Natural Gas 2-2

3. FIELD SURVEY 3-1

3.1 GENERAL 3-1

3.2 OVERVIEW OF FIELD SURVEY OBSERVATIONS 3-2

4. METHOD OF ANALYSIS 4-1

4.1 GENERAL 4-1

4.2 OPTIMUM INSULATION ANALYSIS 4-1

4.3 ENERGY SAVINGS CALCULATIONS 4-12

4.4 CONSTRUCTION COSTS 4-13

4.5 LIFE CYCLE COST ANALYSES 4-13

5. BUILDING DESCRIPTIONS AND RESULTS OF ANALYSIS 5-1

5.1 GENERAL 5-1

5.2 BUILDING 639 (BRANCH PX) 5-1

5.3 BUILDING 636 (BRIGADE HEADQUARTERS) 5-5

5.4 BUILDING 637 (CHAPEL) 5-9

5.5 BUILDING 630 (MESS HALL) 5-13

5.6 BUILDING 638 (ADMINISTRATION) 5-17

5.7 BUILDING 826 (GYMNASIUM) 5-21

5.8 BUILDING 655 (ADMINISTRATION & SUPPLY) 5-25

5.9 BUILDING 651 (BARRACKS WITH A/C) 5-29

5.10 BUILDING 730 (BARRACKS WITHOUT A/C) 5-33

5.11 BUILDING 625 (BATTALION HEADQUARTERS) 5-37

6. SUMMARY AND RECOMMENDATIONS 6-1

6.1 SUMMARY 6-1

6.2 RECOMMENDATIONS 6-1

APPENDICES

A Scope of Work, Confirmation Notices, and Correspondence
B BEACON Energy Analysis Program Description
C Optimum Insulation Analysis Backup Data
D ECO Analysis Backup Data and Field Survey Forms

LIST OF TABLES

TABLE ES-1. SUMMARY OF LIFE CYCLE COSTS ES-3
TABLE ES-2 OPTIMUM INSULATION THICKNESS ES-3
TABLE ES-3. REPRESENTATIVE BUILDINGS FOR FIELD SURVEY ES-5
TABLE ES-4. ECONOMIC SUMMARY OF ECOS - RANKED BY SIR ES-6

TABLE 1-1. BUILDINGS EVALUATED FOR INSULATION 1-3
TABLE 2-1. HISTORICAL DATA FOR ELECTRICAL CONSUMPTION 2-1
TABLE 2-2. HISTORICAL DATA FOR NATURAL GAS CONSUMPTION 2-2
TABLE 3-1. REPRESENTATIVE BUILDINGS FOR FIELD SURVEY 3-1
TABLE 3-2. IDENTICAL AND SIMILAR BUILDINGS 3-4
TABLE 4-1. THICKNESSES OF INSULATION EVALUATED 4-2
TABLE 4-2. R-VALUES USED IN LIFE CYCLE COSTS 4-2
TABLE 4-3. SUMMARY OF LIFE CYCLE COSTS 4-11
TABLE 4-4 OPTIMUM INSULATION THICKNESS 4-11
TABLE 6-1. ECONOMIC SUMMARY OF ECOS - RANKED BY SIR 6-2

LIST OF ABBREVIATIONS

A/C	-	air conditioning
AHU	-	air handling unit
ASHRAE	-	American Society for Heating, Refrigeration and Air-Conditioning Engineers
BAW	-	Brad Adams Walker, Inc.
Bldg.	-	building
Btu	-	British thermal unit
COE	-	Corps of Engineers
DoD	-	Department of Defense
DPW	-	Directorate of Public Works
ECIP	-	Energy Conservation Investment Program
ECO	-	Energy Conservation Opportunity
EMC	-	E M C Engineers, Inc.
F	-	Fahrenheit
ft	-	foot, feet
FY	-	fiscal year
H&V	-	heating and ventilating
hp	-	horsepower
HQ	-	Headquarters
hr	-	hour
HVAC	-	heating, ventilating, and air conditioning
in.	-	inch
kW	-	kilowatt, one thousand watts
kWh	-	kilowatt-hours, one thousand watt-hours
LCCA	-	Life Cycle Cost Analysis
MBtu	-	million British thermal units
mi.	-	mile(s)
MZU	-	multizone unit
PX	-	Post Exchange
SIOH	-	supervision, inspection and overhead
SIR	-	Savings-to-Investment Ratio

SOW	-	scope of work
SPB	-	simple payback
sq ft	-	square foot, feet
SZ	-	single zone
UPW	-	Uniform Present Worth factor
VAV	-	variable air volume
W	-	Watt
yr	-	year(s)

EXECUTIVE SUMMARY

AUTHORIZATION FOR STUDY

This study was conducted and this report prepared under Contract No. DACA01-94-D-0033, Delivery Order No. 0009, issued to E M C Engineers, Inc. (EMC) by the U.S. Army Engineer District, Mobile, on 17 October 1995. The delivery order was managed by the Kansas City District Corps of Engineers for Fort Leonard Wood, Missouri.

PURPOSE OF STUDY

The purpose of the Limited Energy Study, Insulate Brick Buildings, is to determine the economic feasibility of installing insulation in 100 existing brick buildings in the 600, 700, 800, and 1000 areas at Fort Leonard Wood, Missouri. The existing brick wall construction has an approximate R-value of 4 which is low for this geographic location.

APPROACH

The approach taken in performing the study included the following:

- Perform a field survey to document existing conditions of the building envelope such as exterior wall construction, window types, and roof construction; document the interior equipment and objects located on or near exterior walls (because equipment and objects must be relocated before wall insulation can be installed); interview the building managers for building information, occupancy schedules, lighting schedules, and equipment schedules; and record nameplate information of existing mechanical and electrical systems.

- Collect available information and data relative to historical energy usage, current utility rate schedules, building and equipment utilization, and existing energy conservation efforts.

- Review existing building drawings, as available.

- Determine an optimum R-value for exterior walls and roofs using a life cycle cost method; calculate the life cycle cost for installing wall and roof insulation in a typical building at the Fort Leonard Wood.

- Determine the life cycle costs for two types of wall insulation using fiberglass batt insulation and rigid board insulation, and fiberglass batt roof insulation.

- From the list of 100 buildings, determine a representative building from each of the ten building types. For instance, select one representative building out of the group of Mess Hall buildings.

- Evaluate the energy savings available if insulation is installed. Calculate the energy savings using computer energy simulations for the representative buildings, and extrapolate energy savings to identical and similar buildings.

- Evaluate the implementation costs for each of the wall insulation types for each representative building, and extrapolate the implementation costs to identical and similar buildings.

- Summarize energy savings and costs for each building, ranking the buildings by Savings-to-Investment Ratio (SIR) in order of priority.

- Perform LCCAs in accordance with the Energy Conservation Investment Program (ECIP) guidance, using the calculated energy savings and implementation costs.

- Prepare a written report documenting the existing conditions, wall insulation evaluation, energy savings analyses and calculations, implementation costs, recommendations, and conclusions.

METHOD OF ANALYSIS

The method of analysis used in this study included an optimum insulation analysis, energy savings calculations, determination of construction costs, and life cycle cost analysis (LCCA). The optimum insulation analysis was initially performed to determine the optimum thicknesses of insulation for use in the energy savings calculations. The energy savings calculations and construction costs were computed for the energy conservation opportunities (ECOs) evaluated. The energy savings and construction costs were used in the LCCAs to determine the Savings-to-Investment Ratios (SIRs) and Simple Paybacks for the ECOs.

Three categories of insulation construction were evaluated for the purpose of increasing the R-value of exterior walls and roofs. The R-value is a measure of thermal resistance to heat flow through a material. Installing insulation on the exterior walls and roof will increase the total R-values, and therefore will reduce heat loss and provide energy savings. The three categories of insulation evaluated for the walls and roof are as follows:

- Fiberglass batt insulation installed on walls
- Rigid insulation installed on walls
- Fiberglass batt insulation installed on roof.

Optimum Insulation Analysis

The life cycle costs were performed to determine the optimum wall R-values and the roof R-value that would be the most cost effective at Fort Leonard Wood. A representative building (Building 625 - Battalion Headquarters) was chosen as a model building to evaluate the life cycle costs. A life cycle cost was performed for each of the three categories of insulation construction and several thicknesses of insulation within each category. Table ES-1 below summarizes the life cycle costs for these three categories.

Table ES-1. Summary of Life Cycle Costs

	Life Cycle Costs ($)						
Insulation Category	**Thicknesses of Fiberglass Batt Insulation Installed on Walls**						
	0 in.	**1 in.**	**3.5 in.**	**6 in.**	**9 in.**	**12 in.**	-
Wall w/ Fiberglass Batt Insul.	53,449	64,526	61,767	62,414	69,024	70,827	-
	Thicknesses of Rigid Insulation Installed on Walls						
	0 in.	**0.75 in.**	**1 in.**	**1.5 in.**	**2 in.**	**2.5 in.**	**3 in.**
Wall w/ Rigid Insulation	53,449	59,364	59,157	**59,120**	59,513	60,195	60,753
	Thicknesses of Fiberglass Batt Insulation Installed on Roof						
	0 in.	**1 in.**	**3.5 in.**	**6 in.**	**9 in.**	**12 in.**	-
Roof w/ Fiberglass Batt Insul.	64,862	64,266	61,167	**57,773**	59,562	61,365	-

The lowest life cycle costs for insulation installed are the shaded items above. These life cycle costs represent the optimum thicknesses of insulation to be installed on the walls and roof. Table ES-2 below presents the optimum thicknesses of insulation.

Table ES-2. Optimum Insulation Thickness

Insulation Category	Optimum Insulation Thickness
Wall w/ Fiberglass Batt Insulation	3.5 in.
Wall w/ Rigid Insulation	1.5 in.
Roof w/ Fiberglass Batt Insulation	6.0 in.

The optimum wall insulation thicknesses are used in evaluating energy savings for the two types of wall insulation.

The roof insulation was evaluated for its optimum thickness to compare it to the existing thickness of roof insulation. The majority of the buildings have been retrofitted with 6 inches of fiberglass batt insulation, which is the optimum thickness for fiberglass batt roof insulation. Therefore, no further evaluation was performed for roof insulation.

Energy Savings Calculations

Building energy baselines were modeled on the BEACON energy analysis computer program for the ten representative buildings. The building energy baselines reflect the existing conditions of the buildings. The as-built drawings and field survey data provided the source for building inputs to the baselines.

The building energy baselines for the ten representative buildings were used to create ECO energy simulations. The energy simulation for ECO-1 is the baseline modified with the wall U-values of the additional fiberglass batt wall insulation. Similarly, the energy simulation for ECO-2 is the baseline modified with the wall U-values of the additional rigid wall insulation.

- The annual energy savings for natural gas and electricity for the representative buildings were calculated by subtracting the ECO energy use from the baseline energy use. The energy savings were then extrapolated to similar buildings by prorating the savings on a square foot basis.

- Construction costs were generated for the representative building ECOs. As-built drawings provided dimensions for the wall areas being renovated. Field survey data provided information on the quantity and type of interior equipment and objects required to be relocated. Costs for the renovations and relocations were obtained from the RS Means cost estimating guides and material manufacturers.

- The LCCAs were completed for the representative building ECOs. A 20 year economic life was used in the LCCAs. The discount factors were obtained from the Energy Price Indices and Discount Factors for Life-Cycle Cost Analysis 1996 - NISTIR 85-3273-10 (Rev. 10/95). The construction costs were entered into the LCCA calculation sheets.

  The investment costs for the representative buildings, calculated by the LCCAs, were extrapolated to similar buildings by prorating the costs on a square foot basis.

  The LCCAs also calculate SIRs and Simple Paybacks for the ECOs. The Energy Conservation Investment Program (ECIP) Guidance (dated January 1994) was used in the LCCAs. ECOs with SIRs greater than 1.25 and Simple Paybacks less than 10 years will qualify for funding. ECOs with SIRs less than 1.25 and Simple Paybacks greater than 10 years did not qualify for funding.

SUMMARY

The 100 buildings in this study were divided into ten groups on the basis of similar building use and function, with one representative building designated per group. The ten representative buildings were evaluated for two energy conservation opportunities (ECOs) each. ECO-1 represents the installation of fiberglass batt wall insulation, and ECO-2 represents the installation of rigid wall insulation. Energy savings, construction costs, and life cycle cost analyses (LCCAs) were calculated for each ECO.

The ten representative buildings are listed in Table ES-3 below.

Table ES-3. Representative Buildings for Field Survey

Bldg No.	Bldg Name	Sq Ft	Use
639	Branch PX	5,413	Retail Store
636	Brigade HQ	9,236	Administration
637	Chapel	8,949	Church and Administration
630	Mess Hall	13,280	Dining Facility
638	Administration Bldg	3,700	Administration
640	Gymnasium	20,425	Sports Facility
655	Administration/Supply	12,134	Administration and Supply
651	Barracks, with A/C	40,990	Barracks
730	Barracks, without A/C	40,640	Barracks
625	Battalion HQ	6,163	Administration

The annual energy savings for the representative buildings were extrapolated to similar buildings in each building group. The extrapolation was performed on a square foot basis. Likewise, the construction costs were extrapolated to similar buildings in each building group.

The economic summary for ECO-1 and ECO-2 is presented in Table ES-4 beginning on page ES-6. This table ranks the ECOs from highest to lowest savings-to-investment ratio (SIR). The highest SIR calculated is 0.47 with a 35.5 year Simple Payback for Building 637, a Chapel building.

RECOMMENDATIONS

The ECOs presented in Table ES-4 have SIRs less than 1.25 and Simple Paybacks greater than 10 years. These ECOs do not qualify for funding under the ECIP and, therefore, are not recommended for implementation.

TABLE ES-4
ECONOMIC SUMMARY OF ECOs - RANKED BY SIR

BLDG NO.	BLDG NAME	BUILDING AREA (SF)	ECO NO.	NAT. GAS ENERGY SAVINGS (MBtu/yr)	ELEC. ENERGY SAVINGS (MBtu/yr)	TOTAL ENERGY SAVINGS (MBtu/yr)	ELEC. DEMAND SAVINGS (kW)	NAT. GAS COST SAVINGS ($/yr)	ELEC. COST SAVINGS ($/yr)	ELEC. DEMAND COST SAVINGS ($/yr)	TOTAL ENERGY COST SAVINGS ($/yr)	TOTAL INVESTMENT ($)	DISCOUNTED SAVINGS ($)	SIMPLE PAYBACK (yrs)	SIR
637	Chapel	8,949	ECO 1	229.45	35.97	265.42	2.70	$1,216	$263	$200	$1,680	$59,688	$27,931	35.53	0.47
742	Chapel	8,949	ECO 1	229.45	35.97	265.42	2.70	$1,216	$263	$200	$1,680	$59,688	$27,931	35.53	0.47
843	Chapel	8,890	ECO 1	227.94	35.74	263.67	2.68	$1,208	$262	$199	$1,669	$59,295	$27,747	35.53	0.47
637	Chapel	8,949	ECO 2	232.76	37.24	270.00	2.80	$1,234	$273	$208	$1,714	$63,708	$28,470	37.17	0.45
742	Chapel	8,949	ECO 2	232.76	37.24	270.00	2.80	$1,234	$273	$208	$1,714	$63,708	$28,470	37.17	0.45
843	Chapel	8,890	ECO 2	231.23	36.99	268.22	2.78	$1,225	$271	$206	$1,703	$63,288	$28,282	37.17	0.45
639	Branch PX	5,413	ECO 1	49.11	8.26	57.37	1.30	$260	$60	$96	$417	$22,547	$6,757	54.04	0.30
835	Branch PX	6,240	ECO 1	56.61	9.52	66.13	1.50	$300	$70	$111	$481	$25,992	$7,789	54.04	0.30
835	Branch PX	6,240	ECO 2	60.00	10.27	70.27	1.50	$318	$75	$111	$504	$28,015	$8,183	55.54	0.29
639	Branch PX	5,413	ECO 2	52.05	8.91	60.96	1.30	$276	$65	$96	$438	$24,302	$7,099	55.54	0.29
630	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
632	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
653	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
657	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
735	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
739	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
749	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
754	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
820	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
821	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
836	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
837	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
1010	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
1011	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
1027	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
630	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
632	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
653	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
657	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
735	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
739	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
749	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
754	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
820	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
821	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27

TABLE ES-4
ECONOMIC SUMMARY OF ECOs - RANKED BY SIR

BLDG NO.	BLDG NAME	BUILDING AREA (SF)	ECO NO.	NAT. GAS ENERGY SAVINGS (MBtu/yr)	ELEC. ENERGY SAVINGS (MBtu/yr)	TOTAL ENERGY SAVINGS (MBtu/yr)	ELEC. DEMAND SAVINGS (kW)	NAT. GAS COST SAVINGS ($/yr)	ELEC. COST SAVINGS ($/yr)	ELEC. DEMAND COST SAVINGS ($/yr)	TOTAL ENERGY COST SAVINGS ($/yr)	TOTAL INVESTMENT ($)	DISCOUNTED SAVINGS ($)	SIMPLE PAYBACK (yrs)	SIR
836	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
837	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
1010	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
1011	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
1027	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
744	Branch PX	6,240	ECO 1	56.61	9.52	66.13	1.50	$300	$70	$111	$481	$29,219	$7,789	60.75	0.27
744	Branch PX	6,240	ECO 2	60.00	10.27	70.27	1.50	$318	$75	$111	$504	$30,958	$8,183	61.38	0.26
626	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
733	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
734	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
751	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
752	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
823	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
824	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
840	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
841	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
1006	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
1007	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
1025	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
633	Administration/Supply	12,134	ECO 2	127.89	0.00	127.89	0.00	$678	$0	$0	$678	$52,484	$12,038	77.43	0.23
655	Administration/Supply	12,134	ECO 2	127.89	0.00	127.89	0.00	$678	$0	$0	$678	$52,484	$12,038	77.43	0.23
656	Administration/Supply	12,134	ECO 2	127.89	0.00	127.89	0.00	$678	$0	$0	$678	$52,484	$12,038	77.43	0.23
626	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
733	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
734	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
751	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
752	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
823	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
824	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
840	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
841	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
1006	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
1007	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
1025	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
633	Administration/Supply	12,134	ECO 1	122.39	0.00	122.39	0.00	$649	$0	$0	$649	$50,994	$11,520	78.61	0.23

TABLE ES-4
ECONOMIC SUMMARY OF ECOs - RANKED BY SIR

BLDG NO.	BLDG NAME	BUILDING AREA (SF)	ECO NO.	NAT. GAS ENERGY SAVINGS (MBtu/yr)	ELEC. ENERGY SAVINGS (MBtu/yr)	TOTAL ENERGY SAVINGS (MBtu/yr)	ELEC. DEMAND SAVINGS (kW)	NAT. GAS COST SAVINGS ($/yr)	ELEC. COST SAVINGS ($/yr)	ELEC. DEMAND COST SAVINGS ($/yr)	TOTAL ENERGY COST SAVINGS ($/yr)	TOTAL INVESTMENT ($)	DISCOUNTED SAVINGS ($)	SIMPLE PAYBACK (yrs)	SIR
655	Administration/Supply	12,134	ECO 1	122.39	0.00	122.39	0.00	$649	$0	$0	$649	$50,994	$11,520	78.61	0.23
656	Administration/Supply	12,134	ECO 1	122.39	0.00	122.39	0.00	$649	$0	$0	$649	$50,994	$11,520	78.61	0.23
627	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	$1,864	$140	$346	$2,350	$180,374	$39,692	76.76	0.22
628	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	$1,864	$140	$346	$2,350	$180,374	$39,692	76.76	0.22
629	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	$1,864	$140	$346	$2,350	$180,374	$39,692	76.76	0.22
634	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	$1,880	$141	$349	$2,370	$181,928	$40,034	76.76	0.22
635	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	$1,880	$141	$349	$2,370	$181,928	$40,034	76.76	0.22
651	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	$1,880	$141	$349	$2,370	$181,928	$40,034	76.76	0.22
652	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	$1,880	$141	$349	$2,370	$181,928	$40,034	76.76	0.22
654	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	$1,880	$141	$349	$2,370	$181,928	$40,034	76.76	0.22
659	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	$1,880	$141	$349	$2,370	$181,928	$40,034	76.76	0.22
660	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	$1,880	$141	$349	$2,370	$181,928	$40,034	76.76	0.22
1012	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	$1,864	$140	$346	$2,350	$180,374	$39,692	76.76	0.22
1013	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	$1,864	$140	$346	$2,350	$180,374	$39,692	76.76	0.22
1014	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	$1,864	$140	$346	$2,350	$180,374	$39,692	76.76	0.22
1015	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	$1,864	$140	$346	$2,350	$180,374	$39,692	76.76	0.22
1016	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	$1,864	$140	$346	$2,350	$180,374	$39,692	76.76	0.22
1028	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	$1,864	$140	$346	$2,350	$180,374	$39,692	76.76	0.22
1029	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	$1,864	$140	$346	$2,350	$180,374	$39,692	76.76	0.22
627	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	$1,762	$132	$331	$2,225	$175,112	$37,576	78.69	0.21
628	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	$1,762	$132	$331	$2,225	$175,112	$37,576	78.69	0.21
629	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	$1,762	$132	$331	$2,225	$175,112	$37,576	78.69	0.21
634	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	$1,777	$133	$334	$2,244	$176,620	$37,899	78.69	0.21
635	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	$1,777	$133	$334	$2,244	$176,620	$37,899	78.69	0.21
651	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	$1,777	$133	$334	$2,244	$176,620	$37,899	78.69	0.21
652	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	$1,777	$133	$334	$2,244	$176,620	$37,899	78.69	0.21
654	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	$1,777	$133	$334	$2,244	$176,620	$37,899	78.69	0.21
659	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	$1,777	$133	$334	$2,244	$176,620	$37,899	78.69	0.21
660	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	$1,777	$133	$334	$2,244	$176,620	$37,899	78.69	0.21
1012	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	$1,762	$132	$331	$2,225	$175,112	$37,576	78.69	0.21
1013	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	$1,762	$132	$331	$2,225	$175,112	$37,576	78.69	0.21
1014	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	$1,762	$132	$331	$2,225	$175,112	$37,576	78.69	0.21
1015	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	$1,762	$132	$331	$2,225	$175,112	$37,576	78.69	0.21
1016	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	$1,762	$132	$331	$2,225	$175,112	$37,576	78.69	0.21
1028	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	$1,762	$132	$331	$2,225	$175,112	$37,576	78.69	0.21

TABLE ES-4
ECONOMIC SUMMARY OF ECOs - RANKED BY SIR

BLDG NO.	BLDG NAME	BUILDING AREA (SF)	ECO NO.	NAT. GAS ENERGY SAVINGS (MBtu/yr)	ELEC. ENERGY SAVINGS (MBtu/yr)	TOTAL ENERGY SAVINGS (MBtu/yr)	ELEC. DEMAND SAVINGS (kW)	NAT. GAS COST SAVINGS ($/yr)	ELEC. COST SAVINGS ($/yr)	ELEC. DEMAND COST SAVINGS ($/yr)	TOTAL ENERGY COST SAVINGS ($/yr)	TOTAL INVESTMENT ($)	DISCOUNTED SAVINGS ($)	SIMPLE PAYBACK (yrs)	SIR
1029	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	$1,762	$132	$331	$2,225	$175,112	$37,576	78.69	0.21
625	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
631	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
650	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
658	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
732	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
740	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
750	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
753	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
822	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
825	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
838	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
842	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
1008	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
1009	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
1022	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
1023	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
625	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
631	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
650	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
658	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
732	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
740	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
750	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
753	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
822	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
825	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
838	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
842	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
1008	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
1009	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
1022	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
1023	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
638	Administration Bldg	3,700	ECO 2	34.81	5.56	40.37	0.00	$184	$41	$0	$225	$21,836	$3,839	96.95	0.18
743	Administration Bldg	3,700	ECO 2	34.81	5.56	40.37	0.00	$184	$41	$0	$225	$21,836	$3,839	96.95	0.18

TABLE ES-4
ECONOMIC SUMMARY OF ECOs - RANKED BY SIR

BLDG NO.	BLDG NAME	BUILDING AREA (SF)	ECO NO.	NAT. GAS ENERGY SAVINGS (MBtu/yr)	ELEC. ENERGY SAVINGS (MBtu/yr)	TOTAL ENERGY SAVINGS (MBtu/yr)	ELEC. DEMAND SAVINGS (kW)	NAT. GAS COST SAVINGS ($/yr)	ELEC. COST SAVINGS ($/yr)	ELEC. DEMAND COST SAVINGS ($/yr)	TOTAL ENERGY COST SAVINGS ($/yr)	TOTAL INVESTMENT ($)	DISCOUNTED SAVINGS ($)	SIMPLE PAYBACK (yrs)	SIR
832	Administration Bldg	3,700	ECO 2	34.81	5.56	40.37	0.00	$184	$41	$0	$225	$21,836	$3,839	96.95	0.18
638	Administration Bldg	3,700	ECO 1	33.13	5.26	38.39	0.00	$176	$38	$0	$214	$21,565	$3,649	100.74	0.17
743	Administration Bldg	3,700	ECO 1	33.13	5.26	38.39	0.00	$176	$38	$0	$214	$21,565	$3,649	100.74	0.17
832	Administration Bldg	3,700	ECO 1	33.13	5.26	38.39	0.00	$176	$38	$0	$214	$21,565	$3,649	100.74	0.17
730	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
731	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
736	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
737	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
738	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
747	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
748	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
755	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
756	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
757	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
815	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
816	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
817	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
818	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
819	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
827	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
828	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
829	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
830	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
831	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
730	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
731	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
736	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
737	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
738	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
747	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
748	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
755	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
756	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
757	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
815	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14

TABLE ES-1
ECONOMIC SUMMARY OF ECOs - RANKED BY SIR

BLDG NO.	BLDG NAME	BUILDING AREA (SF)	ECO NO.	NAT. GAS ENERGY SAVINGS (MBtu/yr)	ELEC. ENERGY SAVINGS (MBtu/yr)	TOTAL ENERGY SAVINGS (MBtu/yr)	ELEC. DEMAND SAVINGS (kW)	NAT. GAS COST SAVINGS ($/yr)	ELEC. COST SAVINGS ($/yr)	ELEC. DEMAND COST SAVINGS ($/yr)	TOTAL ENERGY COST SAVINGS ($/yr)	TOTAL INVESTMENT ($)	DISCOUNTED SAVINGS ($)	SIMPLE PAYBACK (yrs)	SIR
816	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
817	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
818	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
819	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
827	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
828	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
829	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
830	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
831	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
640	Gymnasium	20,425	ECO 1	160.33	0.00	160.33	0.00	$850	$0	$0	$850	$129,351	$15,092	152.22	0.12
746	Gymnasium	20,425	ECO 1	160.33	0.00	160.33	0.00	$850	$0	$0	$850	$129,351	$15,092	152.22	0.12
826	Gymnasium	20,425	ECO 1	160.33	0.00	160.33	0.00	$850	$0	$0	$850	$129,351	$15,092	152.22	0.12
640	Gymnasium	20,425	ECO 2	166.97	0.00	166.97	0.00	$885	$0	$0	$885	$139,097	$15,717	157.18	0.11
746	Gymnasium	20,425	ECO 2	166.97	0.00	166.97	0.00	$885	$0	$0	$885	$139,097	$15,717	157.18	0.11
826	Gymnasium	20,425	ECO 2	166.97	0.00	166.97	0.00	$885	$0	$0	$885	$139,097	$15,717	157.18	0.11
844	Brigade HQ	9,890	ECO 1	45.94	12.32	58.25	0.86	$243	$90	$64	$397	$61,881	$6,425	155.79	0.10
1018	Brigade HQ	9,890	ECO 1	45.94	12.32	58.25	0.86	$243	$90	$64	$397	$61,881	$6,425	155.79	0.10
636	Brigade HQ	9,236	ECO 1	42.90	11.50	54.40	0.80	$227	$84	$59	$371	$57,789	$6,000	155.79	0.10
741	Brigade HQ	9,236	ECO 1	42.90	11.50	54.40	0.80	$227	$84	$59	$371	$57,789	$6,000	155.79	0.10
844	Brigade HQ	9,890	ECO 2	48.27	12.83	61.10	0.86	$256	$94	$64	$413	$65,384	$6,696	158.19	0.10
1018	Brigade HQ	9,890	ECO 2	48.27	12.83	61.10	0.86	$256	$94	$64	$413	$65,384	$6,696	158.19	0.10
636	Brigade HQ	9,236	ECO 2	45.08	11.98	57.06	0.80	$239	$88	$59	$386	$61,061	$6,253	158.19	0.10
741	Brigade HQ	9,236	ECO 2	45.08	11.98	57.06	0.80	$239	$88	$59	$386	$61,061	$6,253	158.19	0.10

1. INTRODUCTION

1.1 AUTHORITY FOR STUDY

This study was conducted and this report prepared under Contract No. DACA01-94-D-0033, Delivery Order No. 0009, issued to E M C Engineers, Inc. (EMC) by the U.S. Army Engineers District, Mobile, on 17 October 1995. The delivery order was managed by the Kansas City District Corps of Engineers for Fort Leonard Wood, Missouri.

1.2 PURPOSE OF STUDY

The purpose of the Limited Energy Study, Insulate Brick Buildings, is to determine the economic feasibility of installing insulation in 100 existing brick buildings in the 600, 700, 800, and 1000 areas at Fort Leonard Wood, Missouri. The existing brick wall construction has an approximate R-value of 4 which is low for this geographic location.

1.3 SCOPE OF WORK

The Scope of Work for this study is presented in Appendix A. The requirements outlined in the Scope of Work are summarized as follows:

- Perform a limited site survey of specific buildings or areas to collect data required to evaluate the specific energy conservation opportunities (ECOs) included in this study.
- Evaluate specific ECOs to determine their energy savings potential and economic feasibility.
- Provide project documentation for recommended ECOs.
- Prepare a comprehensive report to document work performed, the results, and recommendations.

1.4 APPROACH

The approach taken in performing the study included the following:

- Perform a field survey to document existing conditions of the building envelope such as exterior wall construction, window types, and roof construction; document the interior equipment and objects located on or near exterior walls;

interview the building managers for building information, occupancy schedules, lighting schedules, and equipment schedules; and record nameplate information of existing mechanical and electrical systems.

- Collect available information and data relative to historical energy usage, current utility rate schedules, building and equipment utilization, and existing energy conservation efforts.

- Review existing building drawings, as available.

- Determine an optimum R-value for exterior walls using a life cycle cost method; calculate the life cycle cost for installing wall and roof insulation in a typical building at the Fort Leonard Wood.

- Determine the life cycle costs for two types of wall insulation: fiberglass batt insulation and rigid board insulation, and for fiberglass batt roof insulation.

- From the list of 100 buildings, determine a representative building from each of the ten building types. For instance, select one representative building out of the group of Mess Hall buildings.

- Evaluate the energy savings available if insulation is installed. Calculate the energy savings using computer energy simulations for the representative buildings, and extrapolate energy savings to identical and similar buildings.

- Evaluate the implementation costs for each of the wall insulation types for each representative building, and extrapolate the implementation costs to identical and similar buildings.

- Summarize energy savings and costs for each building, ranking the buildings by Savings-to-Investment Ratio (SIR) in order of priority.

- Perform LCCAs in accordance with the Energy Conservation Investment Program (ECIP) guidance, using the calculated energy savings and implementation costs.

- Prepare a written report documenting the existing conditions, wall insulation evaluation, energy savings analyses and calculations, implementation costs, recommendations, and conclusions.

A total of 100 buildings were included in this study to determine the economic benefits of installing insulation. These buildings are listed in Table 1-1 on the following page in ascending order by building number.

Table 1-1. Buildings Evaluated for Insulation

Bldg. No.	Building Name	Bldg. Area (sq ft)
625	Battalion HQ	6,163
626	Administration/ Supply	12,155
627	Barracks, with A/C	40,640
628	Barracks, with A/C	40,640
629	Barracks, with A/C	40,640
630	Mess Hall	13,280
631	Battalion HQ	6,163
632	Mess Hall	13,280
633	Administration/ Supply	12,134
634	Barracks, with A/C	40,990
635	Barracks, with A/C	40,990
636	Brigade HQ	9,236
637	Chapel	8,949
638	Administration Bldg	3,700
639	Branch PX	5,413
640	Gymnasium	20,425
650	Battalion HQ	6,163
651	Barracks, with A/C	40,990
652	Barracks, with A/C	40,990
653	Mess Hall	13,280
654	Barracks, with A/C	40,990
655	Administration/ Supply	12,134
656	Administration/ Supply	12,134
657	Mess Hall	13,280
658	Battalion HQ	6,163
659	Barracks, with A/C	40,990
660	Barracks, with A/C	40,990
730	Barracks, without A/C	40,640
731	Barracks, without A/C	40,640
732	Battalion HQ	6,163
733	Administration/ Supply	12,155
734	Administration/ Supply	12,155
735	Mess Hall	13,280
736	Barracks, without A/C	40,640
737	Barracks, without A/C	40,640
738	Barracks, without A/C	40,640
739	Mess Hall	13,280
740	Battalion HQ	6,163
741	Brigade HQ	9,236
742	Chapel	8,949
743	Administration Bldg	3,700
744	Branch PX	6,240
746	Gymnasium	20,425
747	Barracks, without A/C	40,640
748	Barracks, without A/C	40,640
749	Mess Hall	13,280
750	Battalion HQ	6,163
751	Administration/ Supply	12,155
752	Administration/ Supply	12,155
753	Battalion HQ	6,163
754	Mess Hall	13,280
755	Barracks, without A/C	40,640
756	Barracks, without A/C	40,640
757	Barracks, without A/C	40,640
815	Barracks, without A/C	40,640
816	Barracks, without A/C	40,640
817	Barracks, without A/C	40,640
818	Barracks, without A/C	40,640
819	Barracks, wothout A/C	40,640
820	Mess Hall	13,280
821	Mess Hall	13,280
822	Battalion HQ	6,163
823	Administration/ Supply	12,155
824	Administration/ Supply	12,155
825	Battalion HQ	6,163
826	Gymnasium	20,425
827	Barracks, without A/C	40,640
828	Barracks, without A/C	40,640
829	Barracks, without A/C	40,640
830	Barracks, without A/C	40,640
831	Barracks, without A/C	40,640
832	Administration Bldg	3,700
835	Branch PX	6,240
836	Mess Hall	13,280
837	Mess Hall	13,280
838	Battalion HQ	6,163
840	Administration/ Supply	12,154
841	Administration/ Supply	12,155
842	Battalion HQ	6,163
843	Chapel	8,890
844	Brigade HQ	9,890
1006	Administration/ Supply	12,155
1007	Administration/ Supply	12,155
1008	Battalion HQ	6,163
1009	Battalion HQ	6,163
1010	Mess Hall	13,280
1011	Mess Hall	13,280
1012	Barracks, with A/C	40,640
1013	Barracks, with A/C	40,640
1014	Barracks, with A/C	40,640
1015	Barracks, with A/C	40,640
1016	Barracks, with A/C	40,640
1018	Brigade HQ	9,890
1022	Battalion HQ	6,163
1023	Battalion HQ	6,163
1025	Administration/ Supply	12,155
1026	Branch PX	8,533
1027	Mess Hall	13,280
1028	Barracks, with A/C	40,640
1029	Barracks, with A/C	40,640

Building 1026, a Branch PX, was built in 1985. It was determined during the course of the analysis that the insulation for the walls and roof for this new building well exceed the optimum thicknesses for insulation. Thus, it was eliminated from the energy savings analysis.

1.5 ORGANIZATION OF REPORT

The narrative of this report has been organized in the following manner:

- Section 2 presents facility data for the different types of buildings in this study.
- Section 3 summarizes the field survey data collected and used for the analysis.
- Section 4 describes the methodology used to perform the energy savings analysis.
- Section 5 presents a detailed description of the representative buildings and the results of the ECO-1 and ECO-2 analyses for each building type.
- Section 6 summarizes the energy savings and economics for the ECOs and provides recommendations for ECOs.

2. FACILITY DATA

2.1 GENERAL

Several types of buildings are evaluated in this study. The building use types include Branch PXs, Brigade Headquarters, Chapels, Mess Halls, Administration, Gymnasiums, Administration-Supply, Barracks, and Battalion Headquarters. The energy sources for these buildings include two fuel types, electricity and natural gas.

2.2 ENERGY SOURCES AND CONSUMPTION

2.2.1 Electricity

The electrical energy use at Fort Leonard Wood is metered at four substations, #1, #2, #3, and #5. Historical electrical energy use and cost data were obtained from billing records at Fort Leonard Wood. The electrical power is provided by the SHO-ME POWER Electric Cooperative utility company.

Table 2-1 below presents the historical data for electrical energy consumption metered at Substations #1, #2, #3, and #5 for the month of September 1995. The electrical energy unit cost is $0.025 per kWh or $7.325 per MBtu.

Table 2-1. Historical Data for Electrical Consumption

Substation No.	Electrical Consumption (kWh)	Electrical Cost ($)
Substation #1	4,219,318	105,482.95
Substation #2	3,685,346	92,133.65
Substation #3	2,658,102	66,452.55
Substation #5	584,217	14,605.43
Totals	11,146,983	278,674.58
Electrical Energy Unit Costs		$0.025 / kWh $7.325 / MBtu

The electrical demand is metered simultaneously for Substations #1, #2, #3, and #5. The total electrical demand for the substations is 26,248 kW. The electrical demand charge is computed using the average billing demand. The current average billing demand, in effect through December 1995, is from the 36 month period ending August 1994. For the month

of September 1995, the average billing demand is 30,524 kW and the electrical demand billing is $188,790.94. The electrical demand unit cost is $6.185/kW.

2.2.2 Natural Gas

Historical data for natural gas consumption was obtained from billing records at Fort Leonard Wood. Table 2-2 below presents the natural gas consumption and cost data beginning with FY93. The natural gas consumption and cost data from FY96 through FY02 is estimated, and is included at the request of the Directorate of Public Works (DPW) Energy. The calculated unit cost provided by DPW for natural gas is also presented.

Table 2-2. Historical Data for Natural Gas Consumption

Fiscal Year	Natural Gas Consumption (MBtu)	Annual Natural Gas Fixed Cost	Annual Natural Gas Variable Cost	Total Annual Natural Gas Cost	Natural Gas Unit Cost
FY 93	371,215	$2,144,931	$2.4885	$3,068,681	$8.27
FY 94	600,783	$2,190,988	$2.4683	$3,673,871	$6.12
FY 95	617,335	$2,114,395	$1.9099	$3,293,422	$5.33
FY 96	625,000	$2,089,752	$1.8099	$3,220,937	$5.15
FY 97	625,000	$2,005,752	$1.8299	$3,149,444	$5.04
FY 98	625,000	$1,795,752	$1.8312	$2,940,259	$4.70
FY 99	625,000	$1,753,752	$1.8524	$2,911,515	$4.66
FY 00	625,000	$1,711,752	$1.8742	$2,883,156	$4.61
FY 01	625,000	$1,699,752	$1.8871	$2,849,160	$4.56
FY 02	625,000	$1,627,752	$1.9102	$2,821,596	$4.51
				Unit Cost of Nat. Gas	$5.30 per MBtu

3. FIELD SURVEY

3.1 GENERAL

A field survey was performed for the purpose of evaluating insulation in 100 brick buildings at Fort Leonard Wood. A detailed field survey was conducted on ten representative buildings to obtain information on the existing condition of the building envelopes, mechanical systems, electrical systems, and interior walls and equipment. A walk-through of the remaining ninety buildings was completed to document whether they were identical or similar to the representative buildings for the purpose of extrapolating the energy savings and investment costs.

The ten representative buildings are listed in Table 3-1 below.

Table 3-1. Representative Buildings for Field Survey

Bldg No.	Bldg Name	Sq Ft	Use
639	Branch PX	5,413	Retail Store
636	Brigade HQ	9,236	Administration
637	Chapel	8,949	Church and Administration
630	Mess Hall	13,280	Dining Facility
638	Administration Bldg	3,700	Administration
640	Gymnasium	20,425	Sports Facility
655	Administration/Supply	12,134	Administration and Supply
651	Barracks, with A/C	40,990	Barracks
730	Barracks, without A/C	40,640	Barracks
625	Battalion HQ	6,163	Administration

The existing conditions and information about the following building components were documented during the field survey:

- Exterior wall construction
- Window glazing types
- Roof construction
- Interior wall construction
- Interior structures, equipment, and fixtures on or adjacent to the exterior walls
- Process equipment that produce internal gains.
- Heating ventilating and air conditioning (HVAC) equipment - nameplate information

- HVAC controls
- Electrical systems

The building managers were interviewed to obtain building information, occupancy schedules, lighting schedules, and equipment schedules. The field survey forms documenting the existing conditions and building information are presented in Appendix D.

The field survey also included obtaining as-built drawings and collecting available data relative to historical energy usage, current utility rate schedules, and existing energy conservation efforts.

The field survey for wall insulation was directed toward the interior surfaces of the perimeter walls. Discussions with the Directorate of Public Works revealed that the exterior of the brick buildings should remain brick in appearance. The building's external appearance is subject to Department of Defense (DOD) codes for esthetics; the established external appearance for buildings in the 600, 700, 800, and 1000 areas is brick.

The installation of wall insulation on the building exterior would require a brick exterior appearance to match the existing buildings. Installing a new brick exterior wall over insulation was cost prohibitive. Exterior Insulation and Finish Systems (EIFSs) were considered for exterior wall insulation at a lower cost than a new brick exterior wall. However, the durability of EIFSs for a long-lasting exterior wall is questionable, as the EIFSs can be damaged by pushing or kicking inward. Therefore, the decision was made to only evaluate insulation installed on interior surfaces.

Additionally, the existing brick and concrete walls are constructed to allow water drainage from the wall air space through weep holes. If the exterior wall is covered over with an insulation system, and if water or moisture leaks into the wall air space, the weep holes would be sealed over with the moisture trapped inside the wall. The moisture build-up inside the brick and concrete walls could lead to deterioration of the walls. Discussion is included at the end of Appendix A.

3.2 OVERVIEW OF FIELD SURVEY OBSERVATIONS

The building envelope components observed during the field survey included the exterior wall construction, window glazing and roof construction. The general observations for these building components are summarize below.

- Exterior Wall Construction - Brick and concrete masonry construction (except the Branch PXs and Gymnasium buildings where a portion of the wall construction consists of insulated metal panels).

- Window Glazing - Double pane glazing with insulated panels on the top one-third of the window frames.

- Roof Construction - As shown on the as-built drawings with 6 inches of fiberglass batt insulation installed after the original construction (except the barracks and gymnasium buildings where fiberglass batt insulation could not be easily installed).

The interior building components which impact this study include the interior structures, equipment and fixtures on or adjacent to the interior wall, and the process equipment that produce internal gains. The interior structures, equipment, and fixtures observed during the field survey include the following:

- Architectural (interior partitions, wall placards, drapery rods and valances, Venetian blinds, shelves, cabinets, and doors).
- Plumbing (latrine sinks, commodes, toilet stalls, water fountains, and slop sinks).
- HVAC Mechanical (floor supply and return grilles, ceiling supply and return grilles, finned-tube baseboard radiation, thermostats, space temperature sensors, fan coil units, and hot and cold water piping).
- Electrical (panels, outlets, light switches, conduit, disconnect boxes, and wall-mounted televisions).
- Lighting (wall-mounted and ceiling-mounted fixtures, emergency lighting, and exit signs).
- Fire Protection (alarm pull switches, alarm sound devices, sprinkler heads, and fire extinguishers).
- Communications (wall-mounted telephones, booth-mounted telephones, and telephone jacks).

The process equipment that produce internal gains observed during the field survey included the following:

- Office equipment (computers, computer printers, typewriters, and copiers).
- Kitchen equipment (refrigerators, ovens, coffee pots, deep-fat fryers, dishwashers, and freezers).
- Entertainment equipment (televisions and video games).
- Laundry equipment (washing machines and clothes dryers).

The mechanical and electrical systems were observed during the field survey. The nameplate information and data was recorded for the equipment. The mechanical and electrical systems include the following:

- HVAC equipment (air handling units, fan coils, baseboard radiation units, pumps, chillers, boilers, and steam-to-hot water converters).
- HVAC controls (thermostat types and set points, equipment control types and set points).
- Lighting (number, type, and wattage of fixtures).

The ten representative buildings were the primary focus of the field survey. The remaining ninety buildings were observed during walk-throughs to document whether they were identical or similar to the representative buildings for the purpose of extrapolating the energy savings and investment costs. The following table presents a summary of the buildings and whether they are identical or similar to the ten representative buildings.

Table 3-2. Identical and Similar Buildings

Bldg No.	Bldg Name	Sq Ft	Use	Reprsnt Bldg	Identical Bldgs	Similar Bldgs	Variance from Representative Bldg.
639	Branch PX	5,413	Retail Store	X			
744	Branch PX	6,240	Retail Store			X	Phone Center w/ 8 booths along west wall.
835	Branch PX	6,240	Retail Store			X	Same as Bldg 744, but no Phone Center
1026	Branch PX	8,533	Retail Store			X	Larger Facility; Interior equipment and objects different
636	Brigade HQ	9,236	Administration	X			
741	Brigade HQ	9,236	Administration		X		
844	Brigade HQ	9,890	Administration			X	Same as 636 with minor variances
1018	Brigade HQ	9,890	Administration			X	Same as 636 with minor variances
637	Chapel	8,949	Church and Administration	X			
742	Chapel	8,949	Church and Administration		X		
843	Chapel	8,890	Church and Administration			X	Same as 637 with minor variances
630	Mess Hall	13,280	Dining Facility	X			
632	Mess Hall	13,280	Dining Facility		X		
653	Mess Hall	13,280	Dining Facility		X		
657	Mess Hall	13,280	Dining Facility		X		
735	Mess Hall	13,280	Dining Facility		X		
739	Mess Hall	13,280	Dining Facility		X		
749	Mess Hall	13,280	Dining Facility		X		

Table 3-2. Identical and Similar Buildings

Bldg No.	Bldg Name	Sq Ft	Use	Reprsnt Bldg	Identical Bldgs	Similar Bldgs	Variance from Representative Bldg.
754	Mess Hall	13,280	Dining Facility		X		
820	Mess Hall	13,280	Dining Facility		X		
821	Mess Hall	13,280	Dining Facility		X		
836	Mess Hall	13,280	Dining Facility		X		
837	Mess Hall	13,280	Dining Facility		X		
1010	Mess Hall	13,280	Dining Facility		X		
1011	Mess Hall	13,280	Dining Facility		X		
1027	Mess Hall	13,280	Dining Facility		X		
638	Administration Bldg	3,700	Administration	X			
743	Administration Bldg	3,700	Administration		X		
832	Administration Bldg	3,700	Administration		X		
640	Gymnasium	20,425	Sports Facility	X			
746	Gymnasium	20,425	Sports Facility		X		
826	Gymnasium	20,425	Sports Facility		X		
626	Admin/Supply	12,155	Admin and Supply		X		
633	Admin/Supply	12,134	Admin and Supply		X		
655	Admin/Supply	12,134	Admin and Supply	X			
656	Admin/Supply	12,134	Admin and Supply		X		
733	Admin/Supply	12,155	Admin and Supply		X		
734	Admin/Supply	12,155	Admin and Supply		X		
751	Admin/Supply	12,155	Admin and Supply		X		
752	Admin/Supply	12,155	Admin and Supply		X		
823	Admin/Supply	12,155	Admin and Supply		X		
824	Admin/Supply	12,155	Admin and Supply		X		
840	Admin/Supply	12,155	Admin and Supply		X		
841	Admin/Supply	12,155	Admin and Supply		X		
1006	Admin/Supply	12,155	Admin and Supply		X		
1007	Admin/Supply	12,155	Admin and Supply		X		
1025	Admin/Supply	12,155	Admin and Supply		X		
627	Barracks, with A/C	40,640	Barracks		X		
628	Barracks, with A/C	40,640	Barracks		X		

Table 3-2. Identical and Similar Buildings

Bldg No.	Bldg Name	Sq Ft	Use	Reprsnt Bldg	Identical Bldgs	Similar Bldgs	Variance from Representative Bldg.
629	Barracks, with A/C	40,640	Barracks		X		
634	Barracks, with A/C	40,990	Barracks		X		
635	Barracks, with A/C	40,990	Barracks		X		
651	Barracks, with A/C	40,990	Barracks	X			
652	Barracks, with A/C	40,990	Barracks		X		
654	Barracks, with A/C	40,990	Barracks		X		
659	Barracks, with A/C	40,990	Barracks		X		
660	Barracks, with A/C	40,990	Barracks		X		
1012	Barracks, with A/C	40,640	Barracks		X		
1013	Barracks, with A/C	40,640	Barracks		X		
1014	Barracks, with A/C	40,640	Barracks		X		
1015	Barracks, with A/C	40,640	Barracks		X		
1016	Barracks, with A/C	40,640	Barracks		X		
1028	Barracks, with A/C	40,640	Barracks		X		
1029	Barracks, with A/C	40,640	Barracks		X		
730	Barracks, without A/C	40,640	Barracks	X			
731	Barracks, without A/C	40,640	Barracks		X		
736	Barracks, without A/C	40,640	Barracks		X		
737	Barracks, without A/C	40,640	Barracks		X		
738	Barracks, without A/C	40,640	Barracks		X		
747	Barracks, without A/C	40,640	Barracks		X		
748	Barracks, without A/C	40,640	Barracks		X		
755	Barracks, without A/C	40,640	Barracks		X		
756	Barracks, without A/C	40,640	Barracks		X		
757	Barracks, without A/C	40,640	Barracks		X		
815	Barracks, without A/C	40,640	Barracks		X		
816	Barracks, without A/C	40,640	Barracks		X		
817	Barracks, without A/C	40,640	Barracks		X		
818	Barracks, without A/C	40,640	Barracks		X		

Table 3-2. Identical and Similar Buildings

Bldg No.	Bldg Name	Sq Ft	Use	Reprsnt Bldg	Identical Bldgs	Similar Bldgs	Variance from Representative Bldg.
819	Barracks, without A/C	40,640	Barracks		X		
827	Barracks, without A/C	40,640	Barracks		X		
828	Barracks, without A/C	40,640	Barracks		X		
829	Barracks, without A/C	40,640	Barracks		X		
830	Barracks, without A/C	40,640	Barracks		X		
831	Barracks, without A/C	40,640	Barracks		X		
625	Battalion HQ	6,163	Administration	X			
631	Data Processing Center	6,163	Administration			X	Additional equipment and fire suppression system
650	Battalion HQ	6,163	Administration		X		
658	Battalion HQ	6,163	Administration		X		
732	Battalion HQ	6,163	Administration		X		
740	Battalion HQ	6,163	Administration		X		
750	Battalion HQ	6,163	Administration		X		
753	Battalion HQ	6,163	Administration		X		
822	Battalion HQ	6,163	Administration		X		
825	Battalion HQ	6,163	Administration		X		
838	Battalion HQ	6,163	Administration			X	Same as 625 with minor variances
842	Battalion HQ	6,163	Administration			X	Same as 625 with minor variances
1008	Battalion HQ	6,163	Administration		X		
1009	Battalion HQ	6,163	Administration		X		
1022	Battalion HQ	6,163	Administration		X		
1023	Battalion HQ	6,163	Administration		X		

4. METHOD OF ANALYSIS

4.1 GENERAL

The method of analysis used in this study is presented in the following subsections, and includes the optimum insulation analysis, energy savings calculations, determination of construction costs, and life cycle cost analysis (LCCA). The optimum insulation analysis was initially performed to determine the optimum thicknesses of insulation for use in the energy savings calculations. The energy savings calculations and construction costs were computed for the energy conservation opportunities (ECOs) evaluated. The energy savings and construction costs were used in the LCCAs to determine the Savings-to-Investment Ratios (SIRs) and Simple Paybacks for the ECOs.

4.2 OPTIMUM INSULATION ANALYSIS

Three categories of insulation construction were evaluated for the purpose of increasing the R-value of exterior walls and roofs. The R-value is a measure of thermal resistance to heat flow through a material. Installing insulation on the exterior walls and roof will increase the total R-values, and therefore will reduce heat loss and provide energy savings. The three categories of insulation evaluated for the walls and roof are as follows:

- Fiberglass batt insulation installed on walls
- Rigid insulation installed on walls
- Fiberglass batt insulation installed on roof.

A life cycle cost was performed for each of the three categories of insulation construction. The life cycle cost sheets, with a graphical presentation of the results for these categories, are presented on pages 4-5 through 4-10.

The life cycle costs were performed to determine the optimum wall R-values and the roof R-value that would be the most cost effective at Fort Leonard Wood. A representative building (Building 625 - Battalion Headquarters) was chosen as a model building to evaluate the life cycle costs. Building 625 was modeled on the BEACON energy analysis computer program to determine its existing energy use. Several thicknesses of insulation were chosen to evaluate the three categories of insulation construction. A separate computer energy simulation was performed for each thickness of insulation to determine the energy use associated with increased R-values. The thicknesses of insulation evaluated in the life cycle costs are presented in Table 4-1 below.

Table 4-1. Thicknesses of Insulation Evaluated

Insulation Category	Thicknesses of Insulation Evaluated in Life Cycle Costs (in.)						
Wall w/ Fiberglass Batt Insulation	0	1.0	3.5	6.0	9.0	12.0	-
Wall w/ Rigid Insulation	0	0.75	1.0	1.5	2.0	2.5	3.0
Roof w/ Fiberglass Batt Insulation	0	1.0	3.5	6.0	9.0	12.0	-

The life cycle costs also include the following parameters:

- R-values for Walls or Roofs with Insulation Installed
- Area of Walls or Roofs
- Total Investment Cost for Installing Insulation
- Annual Energy Use and Energy Costs
- Discounted Energy Costs
- Total Life Cycle Costs

The R-value for a wall is the sum of the R-values of the components that constitute the wall. The existing walls in Building 625 are brick and concrete masonry block construction without insulation, which are representative of the buildings evaluated in this study. Similarly, the roof R-value is the sum of the R-values of its components. The following table summarizes the R-values used in the life cycle costs.

Table 4-2. R-Values Used in Life Cycle Costs

R-values for Walls w/ Fiberglass Insulation							
	Thicknesses of Insulation Installed on Wall						
Wall Materials	0 in.	1 in.	3.5 in.	6 in.	9 in.	12 in.	-
Outside Air Film	0.17	0.17	0.17	0.17	0.17	0.17	-
4 in. Face Brick	0.43	0.43	0.43	0.43	0.43	0.43	-
2 in. Air Space	0.91	0.91	0.91	0.91	0.91	0.91	-
6 in. Concrete Masonry Block	1.89	1.89	1.89	1.89	1.89	1.89	-
Fiberglass Batt Insulation	**0.00**	**3.70**	**11.00**	**19.00**	**30.00**	**38.00**	-
1/2 in. Gypsum Board	0.00	0.45	0.45	0.45	0.45	0.45	-
Inside Air Film	0.68	0.68	0.68	0.68	0.68	0.68	-
Total R-value for Wall	**4.08**	**8.23**	**15.53**	**23.53**	**34.53**	**42.53**	-

R-values for Walls w/ Rigid Insulation							
	Thicknesses of Insulation Installed on Wall						
Wall Materials	0 in.	0.75 in.	1 in.	1.5 in.	2 in.	2.5 in.	3 in.
Outside Air Film	0.17	0.17	0.17	0.17	0.17	0.17	0.17
4 in. Face Brick	0.43	0.43	0.43	0.43	0.43	0.43	0.43
2 in. Air Space	0.91	0.91	0.91	0.91	0.91	0.91	0.91
6 in. Concrete Masonry Block	1.89	1.89	1.89	1.89	1.89	1.89	1.89
Rigid Insulation	**0.00**	**5.40**	**7.20**	**10.80**	**14.40**	**18.00**	**21.60**
3/4 in. Reflective Air Space	0.00	2.77	2.77	2.77	2.77	2.77	2.77
1/2 in. Gypsum Board	0.00	0.45	0.45	0.45	0.45	0.45	0.45
Inside Air Film	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Total R-value for Wall	**4.08**	**12.70**	**14.50**	**18.10**	**21.70**	**25.30**	**28.90**

R-values for Roof w/ Fiberglass Insulation							
	Thicknesses of Insulation Installed on Roof						
Roof Materials	0 in.	1 in.	3.5 in.	6 in.	9 in.	12 in.	-
Outside Air Film	0.17	0.17	0.17	0.17	0.17	0.17	-
Built-up Roofing	0.33	0.33	0.33	0.33	0.33	0.33	-
1 in. Insulation	3.85	3.85	3.85	3.85	3.85	3.85	-
Steel Deck	0.00	0.00	0.00	0.00	0.00	0.00	-
Air Space	0.91	0.91	0.91	0.91	0.91	0.91	-
Fiberglass Batt Insulation	**0.00**	**3.70**	**11.00**	**19.00**	**30.00**	**38.00**	-
Acoustic Ceiling Tile	1.79	1.79	1.79	1.79	1.79	1.79	-
Inside Air Film	0.68	0.68	0.68	0.68	0.68	0.68	-
Total R-value for Roof	**7.73**	**12.70**	**18.73**	**26.73**	**37.73**	**45.73**	-

The wall areas were calculated using dimensions from as-built drawings. The roof area was also taken from the as-built drawings.

The total investment costs for installing insulation include the construction costs, supervision-inspection-overhead (SIOH) costs, and the design costs. The SIOH costs are 7% of the construction cost, and the design costs are 6% of the construction costs.

A total of eighteen computer energy simulations were performed to evaluate the optimum insulation thicknesses. The BEACON energy analysis program was used for the computer energy simulations. These energy simulations are presented in Appendix C. The annual energy use for each thickness of insulation was taken from the BEACON Systems Totals output reports. The heating MBtus for natural gas and the cooling kWh for electricity were entered into the life cycle costs. The annual energy costs were calculated by multiplying the unit costs for natural gas ($5.30/MBtu) and the electricity ($0.025/kWh) by the annual energy use for each.

The annual energy costs were discounted using the discount factors from the Energy Price Indices and Discount Factors for Life-Cycle Cost Analysis 1996 - NISTIR 85-3273-10 (Rev. 10/95). The discount factors from the Census Region 2, Industrial, and a 20-year economic

life were selected. The discount factor for natural gas (17.76) and for electricity (13.80) were multiplied by the annual natural gas costs and electricity costs respectively.

The total life cycle costs for each insulation thickness were obtained by adding the total discounted annual energy costs and the total investment costs together. The life cycle cost sheets are presented on the following pages.

LIFE CYCLE COST - INSTALL FIBERGLASS BATT INSULATION ON WALLS

Economic Life (yrs)
20

Natural Gas Cost ($/MBTU)	5.30
Electric Energy Cost (kWh)	0.025

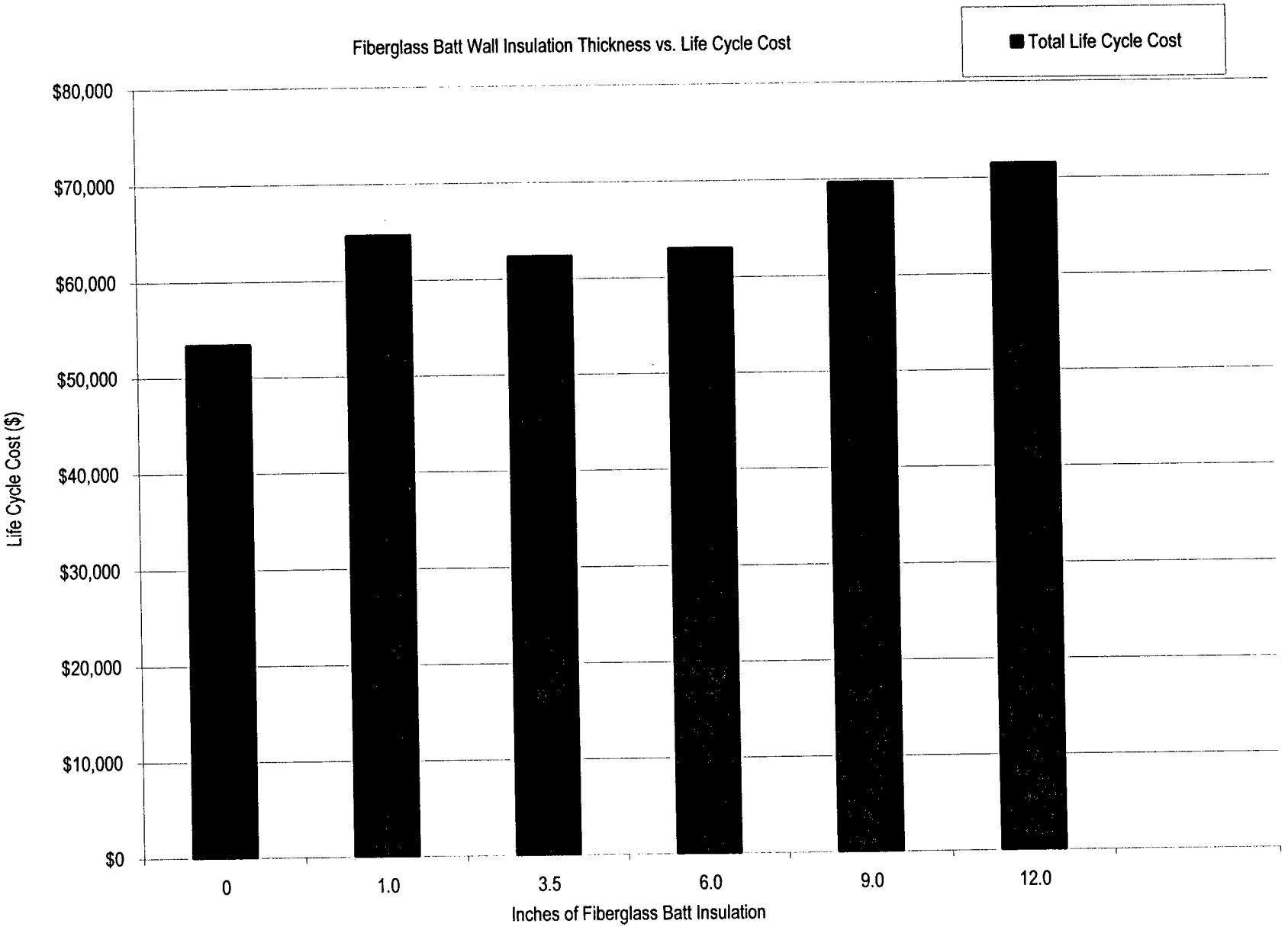
Construction Cost

Building No. 625 - Battalion Headquarters - Fort Leonard Wood, Missouri						
Wall Insulation Thickness (in.)	0	1.0	3.5	6.0	9.0	12.0
Wall R-value with Insulation Installed	3.40	7.02	14.85	22.85	33.85	41.85
Wall Area (sq ft)	3370	3370	3370	3370	3370	3370
Material Cost Per Sq Ft	0	0.831	0.821	1.025	1.576	1.880
Total Material Cost	$0	$2,800	$2,767	$3,454	$5,311	$6,336
Labor Hours Per SqFt	0	0.076	0.076	0.078	0.105	0.107
Labor Rate	0	24.60	24.60	24.60	24.60	24.60
Total Labor Cost	$0	$6,301	$6,301	$6,466	$8,705	$8,871
Total Cost	$0	$9,101	$9,067	$9,921	$14,016	$15,206
Overhead, Bond, Profit, & Conting.	$0	$5,060	$5,041	$5,515	$7,792	$8,454
Construction Cost	$0	$14,161	$14,108	$15,436	$21,808	$23,660

Life Cycle Cost

Fiberglass Batt Insulation Thickness (in.)	0	1.0	3.5	6.0	9.0	12.0
Investment Costs						
Construction Cost	$0	$14,161	$14,108	$15,436	$21,808	$23,660
SIOH (7.0%)	$0	$991	$988	$1,081	$1,527	$1,656
Design Cost (6.0%)	$0	$850	$846	$926	$1,308	$1,420
Total Construction Cost	$0	$16,002	$15,942	$17,443	$24,643	$26,736
Total Investment	$0	$16,002	$15,942	$17,443	$24,643	$26,736
Annual Energy Use						
Natural Gas (MBTU)	480.89	434.48	413.80	406.05	401.34	398.86
Electric Energy (kWh)	23720	22520	21590	21270	21030	20920
Annual Energy Cost						
Natural Gas Cost	$2,549	$2,303	$2,193	$2,152	$2,127	$2,114
Electric Cost	$593	$563	$540	$532	$526	$523
Discount Factors (Region 2)						
Natural Gas	17.76	17.76	17.76	17.76	17.76	17.76
Electric	13.80	13.80	13.80	13.80	13.80	13.80
Discounted Annual Energy Cost						
Natural Gas Discounted Cost	$45,265	$40,897	$38,950	$38,221	$37,777	$37,544
Electric Discounted Cost	$8,183	$7,769	$7,449	$7,338	$7,255	$7,217
Total Discounted Annual Energy Cost	$53,449	$48,666	$46,399	$45,559	$45,033	$44,761
Total Life Cycle Cost	$53,449	$64,668	$62,341	$63,001	$69,676	$71,497

(Total Life Cycle Cost includes Total Investment Cost + Total Discounted Energy Cost)


Fiberglass Batt Wall Insulation Thickness vs. Life Cycle Cost
Total Life Cycle Cost
$80,000
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
Life Cycle Cost ($)
0
1.0
3.5
6.0
9.0
12.0
Inches of Fiberglass Batt Insulation

LIFE CYCLE COST - INSTALL RIGID INSULATION ON WALLS

Economic Life (yrs)
20

Natural Gas Cost ($/MBTU)	5.30
Electric Energy Cost (kWh)	0.025

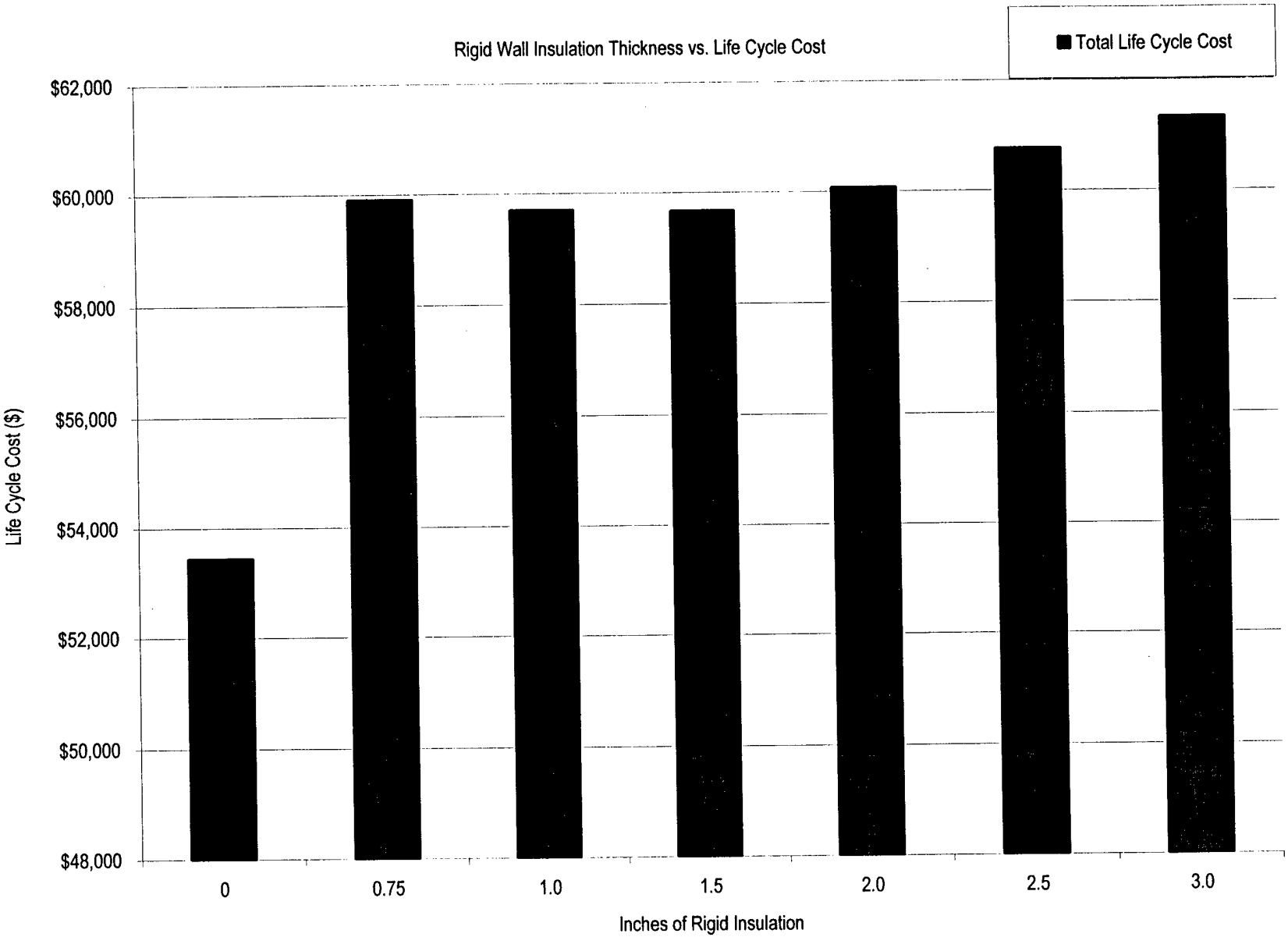
Construction Cost

Building No. 625 - Battalion Headquarters - Fort Leonard Wood, Missouri							
Wall Insulation Thickness (in.)	0	0.75	1.0	1.5	2.0	2.5	3.0
Wall R-value	3.40	10.91	12.51	17.02	20.62	24.22	27.82
Wall Area (sqft)	3370	3370	3370	3370	3370	3370	3370
Material Cost Per Sq Ft	0	0.83	0.87	0.96	1.10	1.23	1.36
Total Material Cost	$0	$2,797	$2,932	$3,235	$3,707	$4,145	$4,583
Labor Hours Per Sq Ft	0	0.053	0.053	0.053	0.054	0.054	0.054
Labor Rate ($/hr)	0	24.60	24.60	24.60	24.60	24.60	24.60
Total Labor Cost	$0	$4,394	$4,394	$4,394	$4,477	$4,477	$4,477
Total Cost	$0	$7,191	$7,326	$7,629	$8,184	$8,622	$9,060
Overhead, Bond, Profit, & Conting.	$0	$3,998	$4,073	$4,241	$4,550	$4,793	$5,037
Construction Cost	$0	$11,189	$11,398	$11,870	$12,733	$13,415	$14,097

Life Cycle Cost

Rigid Insulation Thickness (in.)	0	0.75	1.0	1.5	2.0	2.5	3.0
Investment Costs							
Construction Cost	$0	$11,189	$11,398	$11,870	$12,733	$13,415	$14,097
SIOH (7.0%)	$0	$783	$798	$831	$891	$939	$987
Design Cost (6.0%)	$0	$671	$684	$712	$764	$805	$846
Total Construction Cost	$0	$12,643	$12,880	$13,413	$14,389	$15,159	$15,929
Total Investment	$0	$12,643	$12,880	$13,413	$14,389	$15,159	$15,929
Annual Energy Use							
Natural Gas (MBTU)	480.89	422.02	417.84	412.68	407.21	406.71	404.85
Electric Energy (kWh)	23720	21860	21720	21490	21320	21220	21130
Annual Energy Cost							
Natural Gas Cost	$2,549	$2,237	$2,215	$2,187	$2,158	$2,156	$2,146
Electric Cost	$593	$547	$543	$537	$533	$531	$528
Discount Factors (Region 2)							
Natural Gas	17.76	17.76	17.76	17.76	17.76	17.76	17.76
Electric	13.8	13.80	13.80	13.80	13.80	13.80	13.80
Discounted Annual Energy Cost							
Natural Gas Discounted Cost	$45,265	$39,724	$39,330	$38,845	$38,330	$38,283	$38,108
Electric Discounted Cost	$8,183	$7,542	$7,493	$7,414	$7,355	$7,321	$7,290
Total Discounted Annual Energy Cost	$53,449	$47,266	$46,824	$46,259	$45,685	$45,604	$45,398
Total Life Cycle Cost	$53,449	$59,909	$59,704	$59,672	$60,074	$60,763	$61,327

(Total Life Cycle Cost includes Total Investment Cost + Total Discounted Energy Cost)


Rigid Wall Insulation Thickness vs. Life Cycle Cost
Total Life Cycle Cost
$62,000
$60,000
$58,000
$56,000
$54,000
$52,000
$50,000
$48,000
Life Cycle Cost ($)
0
0.75
1.0
1.5
2.0
2.5
3.0
Inches of Rigid Insulation

LIFE CYCLE COST - INSTALL FIBERGLASS BATT INSULATION ON ROOF

Economic Life (yrs)
20

Electric Energy Cost ($/MBTU	5.30
Electric Energy Cost ($/kWh)	0.025

Construction Cost

Building No. 625 - Battalion Headquarters - Fort Leonard Wood, Missouri						
Roof Insulation Thickness (in.)	0	1	3.5	6	9	12
Roof R-value including Ceiling Space	7.73	11.40	18.73	26.73	37.73	45.73
Roof Area (sq ft)	5795	5795	5795	5795	5795	5795
Material Cost Per Sq Ft	0	0.20	0.22	0.28	0.45	0.61
Total Material Cost	$0	$1,159	$1,275	$1,623	$2,608	$3,535
Labor Hours Per Sq Ft	0	0.005	0.005	0.006	0.007	0.008
Labor Rate	0	24.60	24.60	24.60	24.60	24.60
Total Labor Cost	$0	$713	$713	$855	$998	$1,140
Total Cost	$0	$1,872	$1,988	$2,478	$3,606	$4,675
Overhead, Bond, Profit, & Conting.	$0	$1,041	$1,105	$1,378	$2,005	$2,599
Construction Cost	$0	$2,912	$3,093	$3,856	$5,610	$7,275

Life Cycle Cost

Fiberglass Batt Roof Insul. Thickness (in.)	0	1	3.5	6	9	12
Investment Costs						
Construction Cost	$0	$2,912	$3,093	$3,856	$5,610	$7,275
SIOH (7.0%)	$0	$204	$217	$270	$393	$509
Design Cost (6.0%)	$0	$175	$186	$231	$337	$437
Total Construction Cost	$0	$3,291	$3,495	$4,357	$6,339	$8,221
Total Investment	$0	$3,261	$3,464	$4,319	$6,283	$8,148
Annual Energy Use						
Natural Gas (MBTU)	604.38	562.52	527.37	480.95	479.13	478.47
Electric Energy (kWh)	23110	23350	23370	23720	23710	23710
Annual Energy Cost						
Natural Gas Cost	$3,203	$2,981	$2,795	$2,549	$2,539	$2,536
Electric Cost	$578	$584	$584	$593	$593	$593
Discount Factors (Region 2)						
Natural Gas	17.76	17.76	17.76	17.76	17.76	17.76
Electric	13.80	13.80	13.80	13.80	13.80	13.80
Discounted Annual Energy Cost						
Natural Gas Discounted Cost	$56,889	$52,949	$49,640	$45,271	$45,100	$45,037
Electric Discounted Cost	$7,973	$8,056	$8,063	$8,183	$8,180	$8,180
Total Discounted Annual Energy Cost	$64,862	$61,005	$57,703	$53,454	$53,279	$53,217
Total Life Cycle Cost	$64,862	$64,266	$61,167	$57,773	$59,562	$61,365

(Total Life Cycle Cost includes Total Investment Cost + Total Discounted Energy Cost)

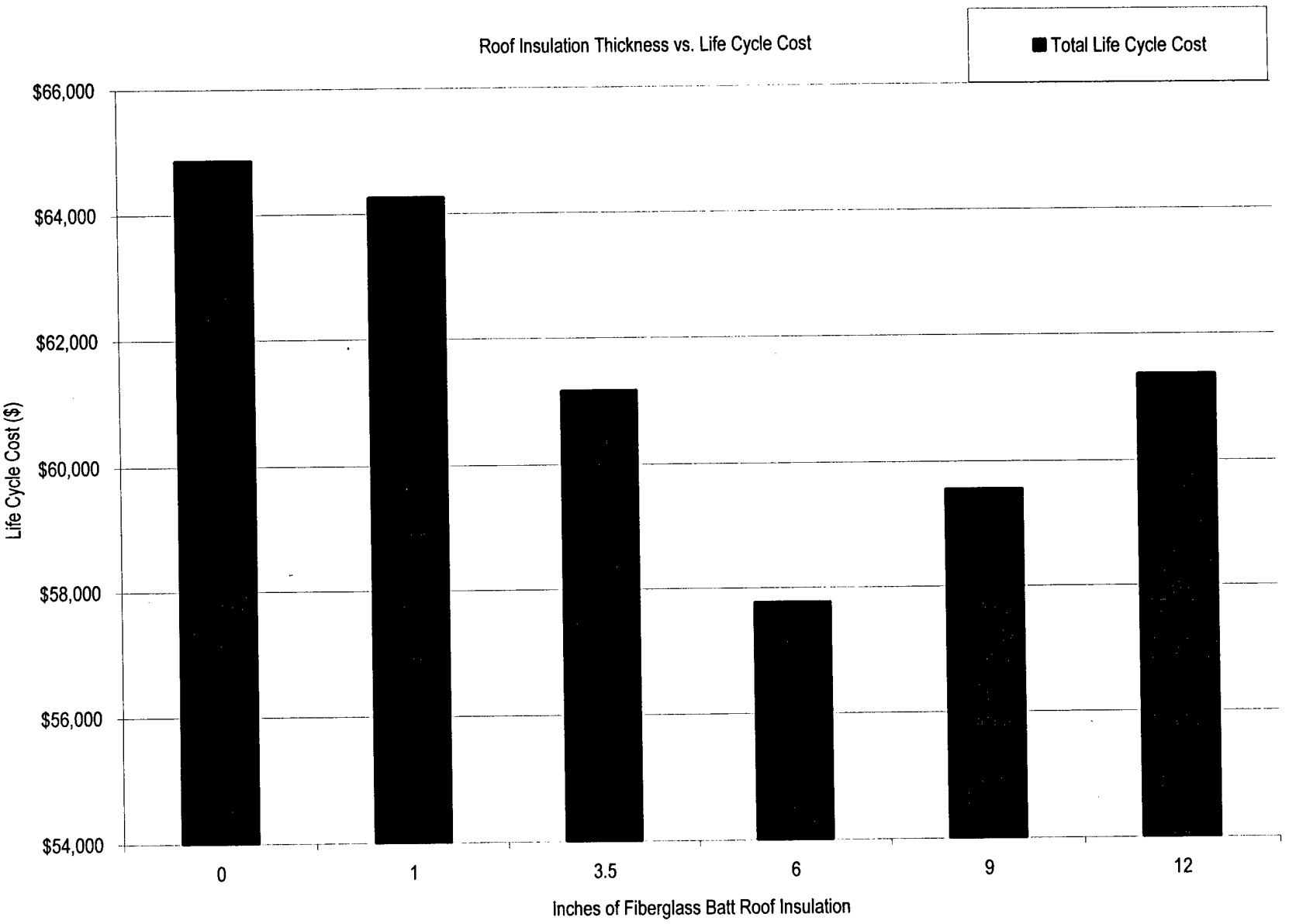

Roof Insulation Thickness vs. Life Cycle Cost
Total Life Cycle Cost
$66,000
$64,000
$62,000
$60,000
$58,000
$56,000
$54,000
Life Cycle Cost ($)
0
1
3.5
6
9
12
Inches of Fiberglass Batt Roof Insulation

Table 4-3 below summarizes the life cycle costs for the three categories of insulation construction.

Table 4-3. Summary of Life Cycle Costs

	Life Cycle Costs ($)						
Insulation Category	**Thicknesses of Fiberglass Batt Insulation Installed on Walls**						
	0 in.	**1 in.**	**3.5 in.**	**6 in.**	**9 in.**	**12 in.**	-
Wall w/ Fiberglass Batt Insul.	53,449	64,526	**61,767**	62,414	69,024	70,827	-
	Thicknesses of Rigid Insulation Installed on Walls						
	0 in.	**0.75 in.**	**1 in.**	**1.5 in.**	**2 in.**	**2.5 in.**	**3 in.**
Wall w/ Rigid Insulation	53,449	59,364	59,157	**59,120**	59,513	60,195	60,753
	Thicknesses of Fiberglass Batt Insulation Installed on Roof						
	0 in.	**1 in.**	**3.5 in.**	**6 in.**	**9 in.**	**12 in.**	-
Roof w/ Fiberglass Batt Insul.	64,862	64,266	61,167	**57,773**	59,562	61,365	-

The lowest life cycle costs for insulation installed are the shaded items above. These life cycle costs represent the optimum thicknesses of insulation to be installed on walls and roof. Table 4-4 below presents the optimum thicknesses of insulation.

Table 4-4 Optimum Insulation Thickness

Insulation Category	Optimum Insulation Thickness
Wall w/ Fiberglass Batt Insulation	3.5 in.
Wall w/ Rigid Insulation	1.5 in.
Roof w/ Fiberglass Batt Insulation	6.0 in.

The optimum wall insulation thicknesses are used in evaluating energy savings for the two types of wall insulation.

The roof insulation was evaluated for its optimum thickness to compare it to the existing thickness of roof insulation. The field survey revealed that the existing roof construction in seven of the ten representative buildings contained an additional 6 inches of fiberglass batt insulation. These buildings have been retrofitted with the optimum thickness of roof insulation. The three representative buildings which have not been retrofitted with fiberglass batt insulation are the barracks, Buildings 651 and 730, and the gymnasium, Building 826. The existing roof constructions in the barracks and gymnasium buildings have ceilings open to the space. For fiberglass batt insulation to be installed economically, a suspended ceiling would also be required. Installing fiberglass batt insulation plus a

suspended ceiling would be costly compared to the small amount of energy dollars saved. Installing additional insulation in the barracks and gymnasium buildings is not recommended. Therefore, no further evaluation was performed for roof insulation.

4.3 ENERGY SAVINGS CALCULATIONS

Building energy baselines for the ten representative buildings were modeled on the BEACON energy analysis computer program. A description of the BEACON energy analysis program is presented in Appendix B. The building energy baselines reflect the existing conditions of the buildings. The as-built drawings and field survey data provided the source for building inputs to the baselines. The building inputs listed below are summarized on the building and internal gains calculation sheets presented in Appendix D. The building inputs for the baselines included the following:

- Building dimensions.
- Construction types for walls, windows, and roof.
- U-values (inverse of R-values) for walls, windows, and roof.
- Building infiltration data.
- Occupants data (number, heat gain parameters, and schedule).
- Lighting data (number, wattage, and schedule).
- Process equipment data (number, wattage, heat gain parameters, and schedule).

The field survey data also provided the source for heating ventilating and air conditioning (HVAC) inputs to the baselines. The HVAC field survey data is presented in Appendix D.

The building energy baselines for the ten representative buildings were used to create ECO energy simulations. The energy simulation for ECO-1 is the baseline with the wall U-values modified to reflect the addition of fiberglass batt wall insulation. Similarly, the energy simulation for ECO-2 is the baseline with the wall U-values modified to reflect the addition of rigid wall insulation.

The annual energy savings for natural gas and electricity for the representative buildings were calculated by subtracting the ECO energy use from the baseline energy use. The energy savings were then extrapolated to similar buildings by prorating the savings on a square foot basis. The annual energy savings summaries for the representative buildings and similar buildings are presented in Appendix D. These annual energy savings were used in the building summary tables in Section 6.

4.4 CONSTRUCTION COSTS

Construction costs were generated for the representative building ECOs. The construction costs for both ECO-1 and ECO-2 included costs for the following:

- Install wall insulation.
- Install gypsum wallboard.
- Tape, level, and paint gypsum wallboard to match adjacent surfaces.
- Install water-proof wallboard with ceramic tile (latrines).
- Relocate interior equipment and objects.

As-built drawings provided dimensions for the wall areas being renovated. Field survey data provided information on the quantity and type of interior equipment and objects required to be relocated. The field survey data for the interior equipment and objects are presented in Appendix D.

A material and labor lookup table was used to create the construction cost sheets. Costs were obtained from the RS Means cost estimating guides and material manufacturers and entered into the lookup table. The material and labor lookup table and manufacturers cutsheets are presented in the first section of Appendix D.

4.5 LIFE CYCLE COST ANALYSES

The LCCAs were completed for the representative building ECOs. A 20 year economic life was used in the LCCAs. The discount factors were obtained from the Energy Price Indices and Discount Factors for Life-Cycle Cost Analysis 1996 - NISTIR 85-3273-10 (Rev. 10/95). The construction costs were entered into the LCCA calculation sheets.

The investment costs for the representative buildings were extrapolated to similar buildings by prorating the costs on a square foot basis. The investment cost summaries for the representative buildings and similar buildings are presented in Appendix D. These investment costs are used in the building summary tables in Section 6.

The LCCAs calculate SIRs and Simple Paybacks for the ECOs. The Energy Conservation Investment Program (ECIP) Guidance (dated January 1994) was used in the LCCAs. ECOs with SIRs greater than 1.25 and Simple Paybacks less than 10 years will qualify for funding. ECOs with SIRs less than 1.25 and Simple Paybacks greater than 10 years will not qualify for funding.

5. BUILDING DESCRIPTIONS AND RESULTS OF ANALYSIS

5.1 GENERAL

This section provides a description of each representative building including building use, building construction, exterior elevation photograph, building interior, lighting, and HVAC systems. The energy use and energy costs for the representative building baselines are presented. The results of the ECO-1 and the ECO-2 analyses for each representative building are also included.

5.2 BUILDING 639 (BRANCH PX)

Description of Existing Conditions

Building 639 is a 5,413 sq ft one-story building. The original building (4,221 sq ft) was built in 1962, with an 1,192 sq ft addition added later. The building is divided into two areas, a retail store located in the original building and a video arcade located in the addition. The building is open for business 1700 to 2000 hours on Tuesdays through Saturdays and 1300 to 1930 hours on Sundays. The Branch PX has three employees and serves approximately 50 people per day.



The original building wall construction is 4 in. face brick, air space, and 6 in. concrete masonry block. The addition wall construction consists of face brick and concrete masonry block up to a height of five feet, with insulated metal panels from there up to the roof. The roof construction is a built-up roof on 1.5 inches of rigid insulation, a metal deck, ceiling air space, 6 inches of fiberglass batt insulation, and acoustic ceiling tile. The windows are clear double pane glass in aluminum frames, vertical sliders, and have insulated metal panels in the top one-third of the frames.

The interior of the retail store has several clothing shelves along the exterior walls. The interior of the video arcade has several video games and two fan coil units along the exterior walls. The video arcade also has wood paneling covering the walls at a height of 3 feet. The windows have adjustable venetian blinds for window shades.

The lighting in the retail store area is provided by 34 watt fluorescent lamps with standard ballasts. The video arcade lighting is a combination of 34 watt fluorescent lamps with standard ballasts and 60 watt incandescent track lighting.

The retail store is heated and cooled by a three zone multizone air handling unit (MZU). The addition is heated and cooled by two fan coil units. Cooling is provided by two air-cooled condensing units, one serving the MZU and the other serving the fan coil units. A central steam plant provides steam heat to the MZU and fan coil units.

Existing Baseline Energy Consumption

The baseline energy use for the Branch PX, reported from the BEACON energy analysis program, is presented on the following page.

Energy Savings Analysis

Two building energy baselines were created for the Branch PX using the BEACON energy analysis program. One baseline was created for the retail store and the other baseline for the video arcade. Energy simulations for ECO-1 and ECO-2 were generated from the baselines to analyze the addition of fiberglass batt wall insulation and rigid wall insulation, respectively.

ANNUAL BASELINE ENERGY USE

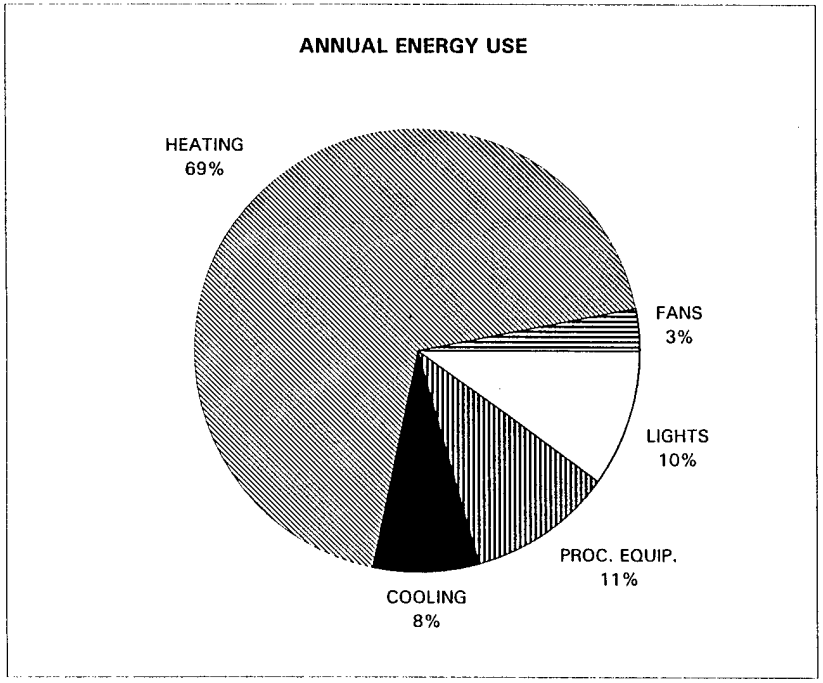
Bldg. No.:	639
Bldg. Name:	Branch PX

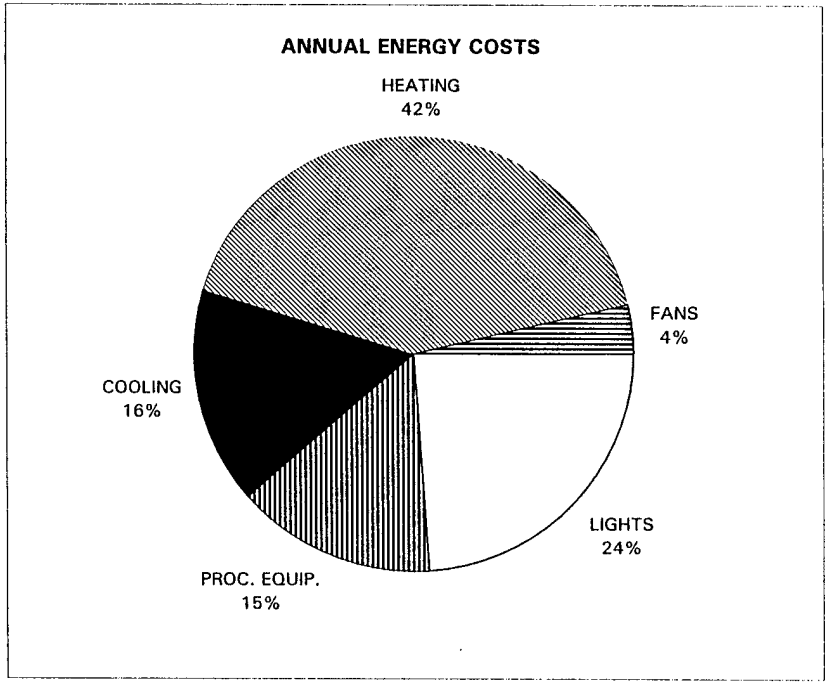
Conditioned Floor Area (Sq Ft):	4,752
Bldg. Energy Use (Btu/Sq Ft):	187,411

ENERGY UNIT COSTS

Electricity	$0.0250	/kWh
Electric Demand	$74.22	/kW/yr
Natural Gas	$5.30	/MBtu

ITEM	ELECTRICITY (kWh)	PEAK ELECTRIC DEMAND (kW)	NATURAL GAS (MBtu)	TOTAL ENERGY USE (MBtu)	ELECTRIC ENERGY COST ($)	ELECTRIC DEMAND COST ($)	NAT. GAS ENERGY COST ($)	TOTAL ENERGY COST ($)
LIGHTS	25,890	16.33		88	647	1,212	0	1,859
PROC. EQUIP.	27,911	6.15		95	698	457	0	1,154
COOLING	20,410	10.14		70	510	753	0	1,263
HEATING			610.5	610	0	0	3,236	3,236
FANS	7,850	1.18		27	196	88	0	284
TOTAL	82,061	33.8	610	891	2,052	2,509	3,236	7,796





The annual energy savings were calculated by subtracting the energy use of the ECOs from the baseline. The Branch PX annual energy savings for ECO-1 and ECO-2 are presented in the following table.

Bldg. No.	Computer Simulation	Annual Heating (MBtu)	Annual Cooling (kWh)	Annual Cooling (Convert kWh to MBtu)	Peak Electric Demand (kW)	Annual Heating Savings (MBtu)	Annual Cooling Savings (MBtu)	Peak Electric Demand Savings (kW)
639A (Store)	Baseline	541.6	16,600	56.7	27.7	-	-	-
	ECO-1	497.8	14,370	49.0	26.5	43.8	7.6	1.2
	ECO-2	495.7	14,220	48.5	26.5	45.9	8.1	1.2
639B (Arcade)	Baseline	68.9	3,810	13.0	6.1	-	-	-
	ECO-1	63.6	3,620	12.4	6.0	5.3	0.7	0.1
	ECO-2	62.8	3,580	12.2	6.0	6.2	0.8	0.1
639	ECO-1					**49.1**	**8.3**	**1.3**
	ECO-2					**52.1**	**8.9**	**1.3**

One building in this group had significant differences in interior furnishings and equipment, requiring separate construction costs in addition to the representative building construction costs. This building and its significant difference is noted as follows:

- Building 744 (Branch PX) - Telephone communication center requires relocation of eight telephone booths.

The construction costs for Building 744 is presented in Appendix D.

Results of Energy Savings and Economic Analysis

The energy savings and economic analysis for ECO-1 and ECO-2 are presented in Appendix D. The results of the analysis are summarized in the table below.

Item	ECO-1	ECO-2
Annual Electric Energy Savings (MBtu)	8.26	8.91
Annual Electric Demand Savings (kW)	1.3	1.3
Annual Natural Gas Savings (MBtu)	49.11	52.05
Total Annual Cost Savings	$417	$438
Investment Cost	$22,547	$24,302
Savings-to-Investment Ratio (SIR)	0.30	0.29
Simple Payback (yrs)	54.03	55.53

5.3 BUILDING 636 (BRIGADE HEADQUARTERS)

Description of Existing Conditions

Building 636 is a 9,236 sq ft two-story building with a full basement. The building was built in 1962. The building is occupied from 0730 to 1900 hours on Mondays through Fridays. The Brigade Headquarters is an administrative facility for troop logistics and has approximately 30 personnel.



The building wall construction is 4 in. face brick, air space, and 6 in. concrete masonry block. The roof construction is a built-up roof on 3 in. of rigid insulation, a 6.5 in. concrete deck, ceiling air space, 6 in. of fiberglass batt insulation, and acoustic ceiling tile. The windows are clear double pane glass in aluminum frames, vertical sliders, and have insulated metal panels in the top one-third of the frames.

The interior office areas of the Brigade Headquarters have a variety of storage cabinets and credenzas along the exterior walls. The walls are covered with a decorative jute wall covering and wood paneling at a height of 2.5 ft. The windows have adjustable venetian blinds for window shades.

The lighting in the office areas is provided by 40 watt fluorescent lamps with standard ballasts; lighting in the toilets and storage closets is provided by 100 watt incandescent lamps.

The Brigade Headquarters is heated and cooled throughout by fan coil units with outside air for ventilation. The basement is heated by hot water unit heaters. Cooling is provided by an air-cooled water chiller serving the fan coil units. A central steam plant provides steam to a steam-to-hot water converter in the basement mechanical room. The steam-to-hot water converter provides hot water to the fan coil units and unit heaters.

Existing Baseline Energy Consumption

The baseline energy use for the Brigade Headquarters, reported from the BEACON energy analysis program, is presented on the following page.

ANNUAL BASELINE ENERGY USE

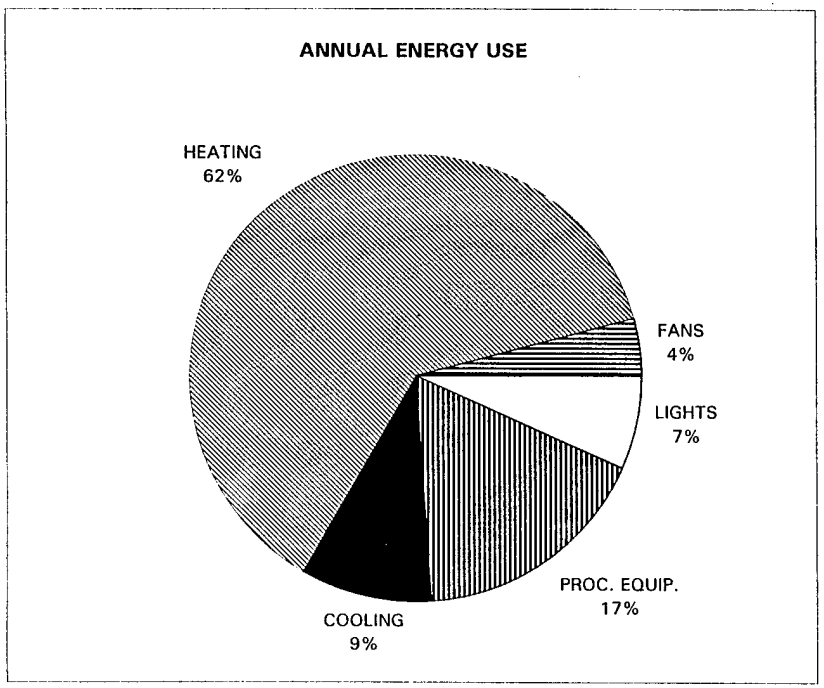
Bldg. No.:	636
Bldg. Name:	Brigade HQ

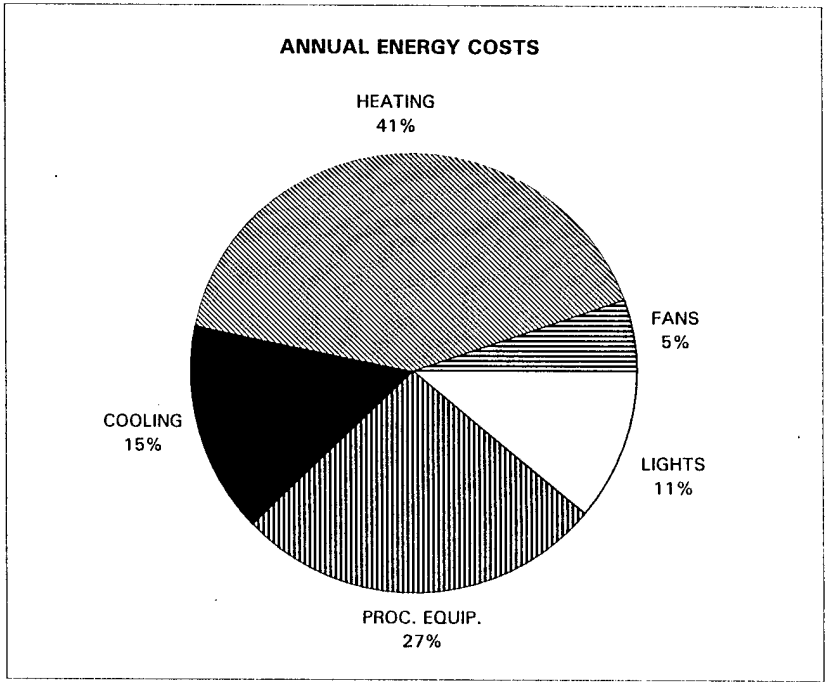
Conditioned Floor Area (Sq Ft):	9,044
Bldg. Energy Use (Btu/Sq Ft):	183,508

ENERGY UNIT COSTS

Electricity	$0.0250	/kWh
Electric Demand	$74.22	/kW/yr
Natural Gas	$5.30	/MBtu

ITEM	ELECTRICITY (kWh)	PEAK ELECTRIC DEMAND (kW)	NATURAL GAS (MBtu)	TOTAL ENERGY USE (MBtu)	ELECTRIC ENERGY COST ($)	ELECTRIC DEMAND COST ($)	NAT. GAS ENERGY COST ($)	TOTAL ENERGY COST ($)
LIGHTS	32,210	9.09		110	805	675	0	1,480
PROC. EQUIP.	84,202	19.02		287	2,105	1,412	0	3,517
COOLING	45,940	12.09		157	1,149	897	0	2,046
HEATING			1,032.8	1,033	0	0	5,474	5,474
FANS	20,750	2.20		71	519	163	0	682
TOTAL	183,102	42.4	1,033	1,658	4,578	3,147	5,474	13,198





Energy Savings Analysis

The building energy baseline was created for the Brigade Headquarters using the BEACON energy analysis program. Energy simulations for ECO-1 and ECO-2 were generated from the baseline to analyze the addition of fiberglass batt wall insulation and rigid wall insulation, respectively.

The annual energy savings were calculated by subtracting the energy use of the ECOs from the baseline. The Brigade Headquarters annual energy savings for ECO-1 and ECO-2 are presented in the following table.

Bldg. No.	Computer Simulation	Annual Heating (MBtu)	Annual Cooling (kWh)	Annual Cooling (Convert kWh to MBtu)	Peak Electric Demand (kW)	Annual Heating Savings (MBtu)	Annual Cooling Savings (MBtu)	Peak Electric Demand Savings (kW)
636	Baseline	1,034.8	45,940	156.8	42.4	-	-	-
	ECO-1	991.9	42,570	145.3	41.6	**42.9**	**11.5**	**0.8**
	ECO-2	989.7	42,430	144.8	41.6	**45.1**	**12.0**	**0.8**

Results of Energy Savings and Economic Analysis

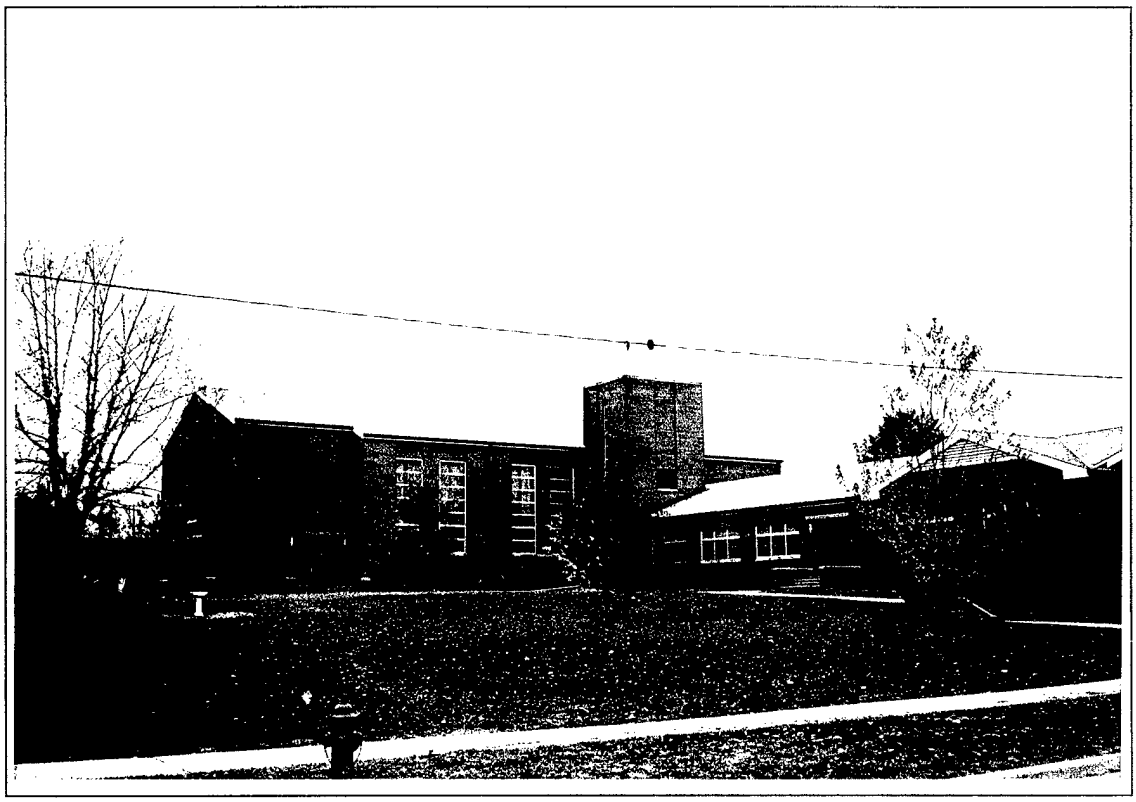
The energy savings and economic analysis for ECO-1 and ECO-2 are presented in Appendix D. The results of the analysis are summarized in the table below.

Item	ECO-1	ECO-2
Annual Electric Energy Savings (MBtu)	11.50	11.98
Annual Electric Demand Savings (kW)	0.8	0.8
Annual Natural Gas Savings (MBtu)	42.90	45.08
Total Annual Cost Savings	$371	$386
Investment Cost	$57,789	$61,061
Savings-to-Investment Ratio (SIR)	0.10	0.10
Simple Payback (yrs)	155.77	158.17

5.4 BUILDING 637 (CHAPEL)

Description of Existing Conditions

Building 637 is a 8,949 sq ft one-story building built in 1956. The Chapel has a 5,307 sq ft sanctuary with a 300 seat capacity, and a 3,642 sq ft office area for administration. The sanctuary holds religious services from 0700 to 1230 hours on Sundays with a total of 100 people in attendance. The Chapel office area is occupied from 0830 to 1700 hours on Mondays through Fridays and 0630 to 1230 on Saturdays, with five administrative personnel.



The sanctuary wall construction is 4 in. face brick, air space, and 12 in. concrete masonry block. The office area wall construction is the same, except it has 6 in. concrete masonry block The roof construction for the sanctuary consists of composite shingles on roof felt, plywood sheathing, 1 in. rigid insulation, and a wood deck. The office area roof construction consists of composite shingles on roof felt, plywood sheathing, an attic air space, 3 in. blown-in cellulose insulation, 3 in. fiberglass batt insulation, and gypsum board ceiling. The windows are clear double pane glass in aluminum frames, vertical sliders, and have insulated metal panels in the top one-third of the frames. The sanctuary has stained glass windows on the south elevation.

The interior of the sanctuary has painted concrete masonry block walls and wood paneling along the east and west walls at a height of 4 ft. The office area of the Chapel has a variety of storage cabinets and tables along the exterior walls. The walls are painted concrete masonry block. The windows in the sanctuary and office area have cloth draperies for window shades.

The lighting in the sanctuary is provided by 750 watt incandescent lamps. The lighting in the office area is provided by a combination of 34 watt fluorescent lamps with standard ballasts and 60 watt incandescent lamps.

The sanctuary is heated and cooled with a single zone air handling unit (SZ AHU). The office area is heated and cooled by fan coil units with outside air for ventilation. Cooling is provided by two air-cooled condensing units, one serving the SZ AHU and the other serving the fan coil units. A central steam plant provides steam to two steam-to-hot water converters in the basement mechanical room. One steam-to-hot water converter provides hot water to the SZ AHU, the other provides hot water to the fan coil units.

Existing Baseline Energy Consumption

The baseline energy use for the Chapel, reported from the BEACON energy analysis program, is presented on the following page.

ANNUAL BASELINE ENERGY USE

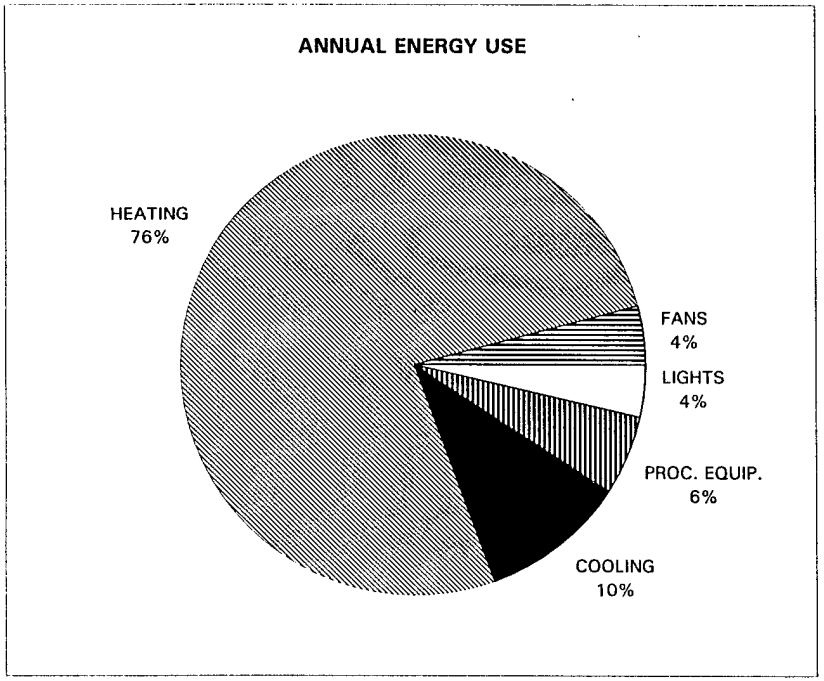
Bldg. No.:	637
Bldg. Name:	Chapel

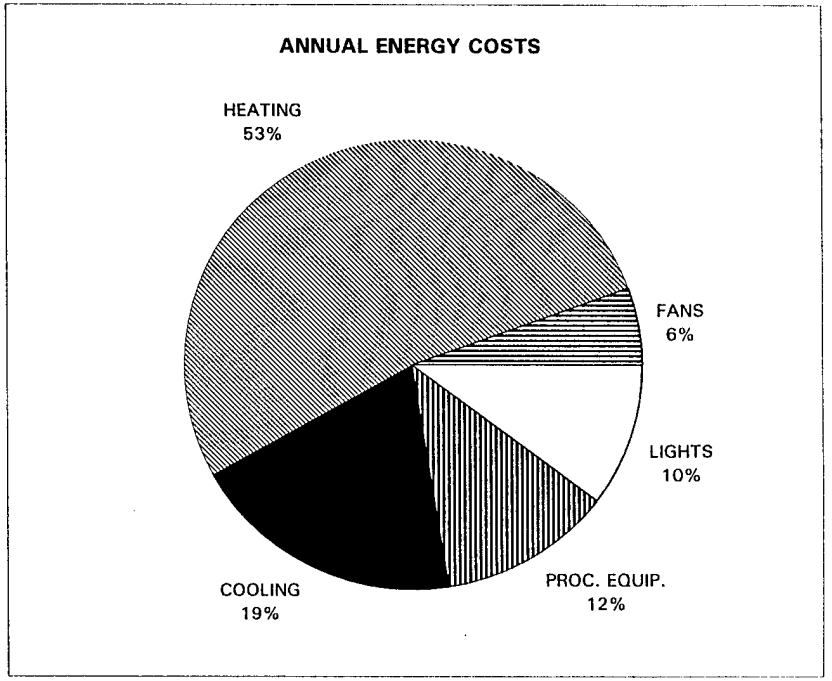
Conditioned Floor Area (Sq Ft):	7,836
Bldg. Energy Use (Btu/Sq Ft):	208,736

ENERGY UNIT COSTS

Electricity	$0.0250	/kWh
Electric Demand	$74.22	/kW/yr
Natural Gas	$5.30	/MBtu

ITEM	ELECTRICITY (kWh)	PEAK ELECTRIC DEMAND (kW)	NATURAL GAS (MBtu)	TOTAL ENERGY USE (MBtu)	ELECTRIC ENERGY COST ($)	ELECTRIC DEMAND COST ($)	NAT. GAS ENERGY COST ($)	TOTAL ENERGY COST ($)
LIGHTS	16,910	11.48		58	423	852	0	1,275
PROC. EQUIP.	26,642	12.06		91	666	895	0	1,561
COOLING	50,190	15.88		171	1,255	1,179	0	2,434
HEATING			1,246.8	1,247	0	0	6,608	6,608
FANS	20,190	2.57		69	505	191	0	696
TOTAL	113,932	42.0	1,247	1,636	2,848	3,117	6,608	12,574





Energy Savings Analysis

Two building energy baselines were created for the Chapel using the BEACON energy analysis program. One baseline was created for the sanctuary and the other baseline for the office area. Energy simulations for ECO-1 and ECO-2 were generated from the baselines to analyze the addition of fiberglass batt wall insulation and rigid wall insulation, respectively.

The annual energy savings were calculated by subtracting the energy use of the ECOs from the baseline. The Chapel annual energy savings for ECO-1 and ECO-2 are presented in the following table.

Bldg. No.	Computer Simulation	Annual Heating (MBtu)	Annual Cooling (kWh)	Annual Cooling (Convert kWh to MBtu)	Peak Electric Demand (kW)	Annual Heating Savings (MBtu)	Annual Cooling Savings (MBtu)	Peak Electric Demand Savings (kW)
637A	Baseline	1,172.6	35,550	121.3	28.3	-	-	-
(Sanctu-	ECO-1	962.1	26,470	90.3	26.4	210.6	31.0	1.9
ary)	ECO-2	959.5	26,200	89.4	26.4	213.1	31.9	1.9
637B	Baseline	74.2	14,640	50.0	13.7	-	-	-
(Office	ECO-1	55.3	13,180	45.0	12.9	18.9	5.0	0.8
Area)	ECO-2	54.5	13,080	44.6	12.8	19.6	5.3	0.9
637	ECO-1					**229.5**	**36.0**	**2.7**
	ECO-2					**232.8**	**37.2**	**2.8**

Results of Energy Savings and Economic Analysis

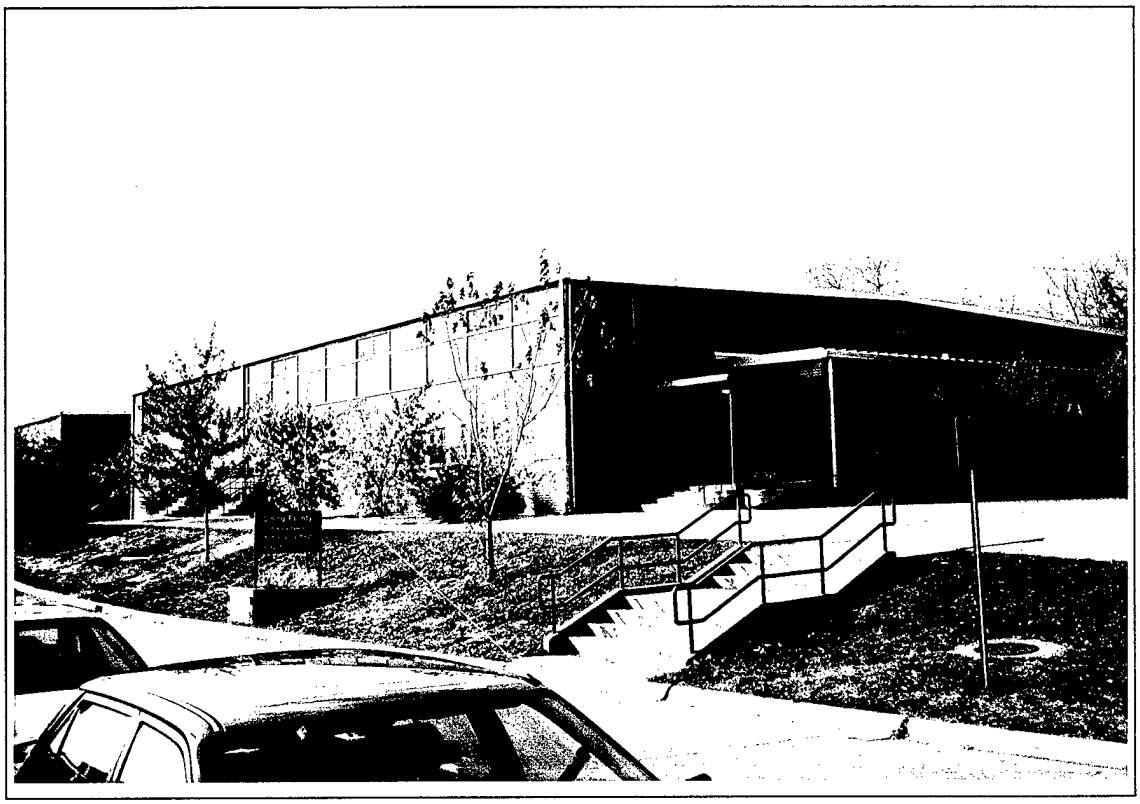
The energy savings and economic analysis for ECO-1 and ECO-2 are presented in Appendix D. The results of the analysis are summarized in the table below.

Item	ECO-1	ECO-2
Annual Electric Energy Savings (MBtu)	35.97	37.24
Annual Electric Demand Savings (kW)	2.7	2.8
Annual Natural Gas Savings (MBtu)	229.45	232.76
Total Annual Cost Savings	$1,680	$1,714
Investment Cost	$59,688	$63,708
Savings-to-Investment Ratio (SIR)	0.47	0.45
Simple Payback (yrs)	35.53	37.16

5.5 BUILDING 630 (MESS HALL)

Description of Existing Conditions

Building 630 is a 13,280 sq ft one-story building built in 1956. The Mess Hall has a 4,593 sq ft kitchen, and a 8,687 sq ft dining room. The Mess Hall is open from 0300 to 2100 hours on Mondays through Fridays and 0800 to 1900 on Saturdays and Sundays. The kitchen has approximately 20 service personnel. Approximately 270 personnel are served daily in the dining room.



The Mess Hall wall construction is 4 in. face brick, air space, and 6 in. concrete masonry block. The roof construction consists of a built-up roof on 1.5 inches of rigid insulation, a metal deck, ceiling air space, 6 inches of fiberglass batt insulation, and a plaster ceiling. The windows are clear, double pane glass in aluminum frames, vertical sliders, and have insulated metal panels in the top one-half of the frames.

The kitchen has ceramic tile block on the interior surface of walls to facilitate frequent washing. The kitchen has equipment and sinks located along the exterior walls. The dining room has a combination of painted concrete masonry block, ceramic tile block, and insulated metal panels on the interior surface of walls. The windows have cloth draperies for window shades.

The lighting in the Mess Hall is provided by a combination of 34 watt fluorescent lamps with standard ballasts and 60 watt incandescent lamps.

The kitchen is heated and ventilated with two heating and ventilating units (H&Vs). The dining room is heated and cooled with two single zone air handling units (SZ AHUs). Cooling is provided by a central chilled water plant and is pumped to the SZ AHUs serving the dining room. A central steam plant provides steam to a steam-to-hot water converter in the basement mechanical room. The steam-to-hot water converter provides hot water to the H&Vs and the SZ AHUs.

Existing Baseline Energy Consumption

The baseline energy use for the Mess Hall, reported from the BEACON energy analysis program, is presented on the following page.

ANNUAL BASELINE ENERGY USE

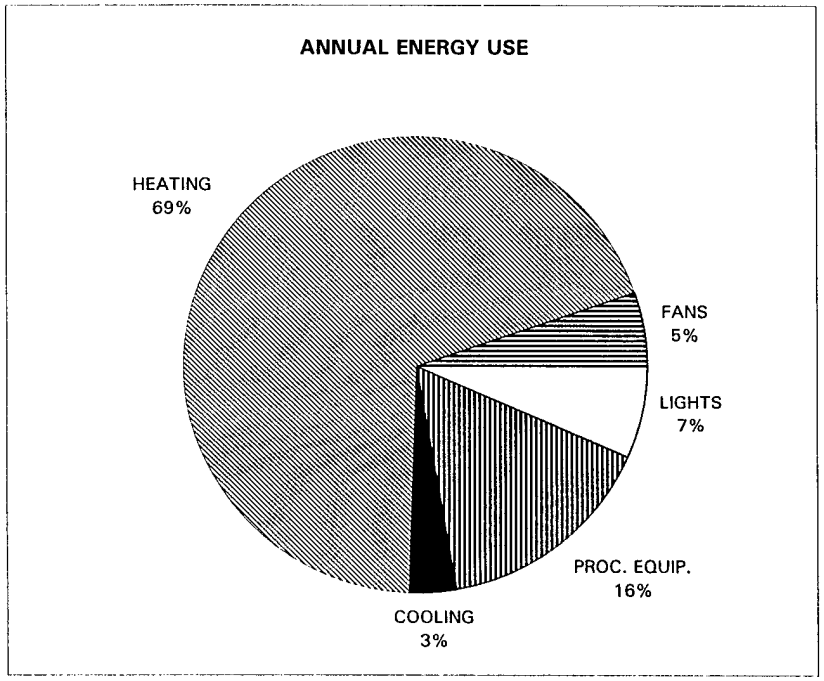
Bldg. No.:	630
Bldg. Name:	Mess Hall

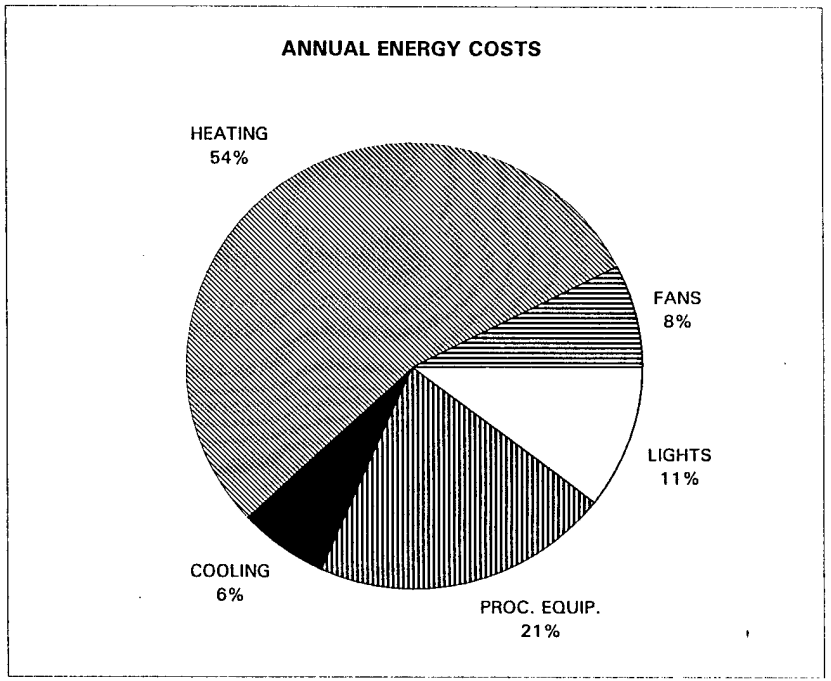
Conditioned Floor Area (Sq Ft):	10,991
Bldg. Energy Use (Btu/Sq Ft):	370,336

ENERGY UNIT COSTS

Electricity	$0.0250	/kWh
Electric Demand	$74.22	/kW/yr
Natural Gas	$5.30	/MBtu

ITEM	ELECTRICITY (kWh)	PEAK ELECTRIC DEMAND (kW)	NATURAL GAS (MBtu)	TOTAL ENERGY USE (MBtu)	ELECTRIC ENERGY COST ($)	ELECTRIC DEMAND COST ($)	NAT. GAS ENERGY COST ($)	TOTAL ENERGY COST ($)
LIGHTS	80,680	12.19		275	2,017	905	0	2,922
PROC. EQUIP.	184,919	15.37		631	4,623	1,141	0	5,764
COOLING	39,000	10.07		133	975	747	0	1,722
HEATING			2,815.0	2,815	0	0	14,920	14,920
FANS	63,210	6.57		216	1,580	487	0	2,068
TOTAL	367,809	44.2	2,815	4,070	9,195	3,281	14,920	27,395





Energy Savings Analysis

Two building energy baselines were created for the Mess Hall using the BEACON energy analysis program. One baseline was created for the kitchen and the other baseline for the dining room. Energy simulations for ECO-1 and ECO-2 were generated from the baselines to analyze the addition of fiberglass batt wall insulation and rigid wall insulation, respectively.

The annual energy savings were calculated by subtracting the energy use of the ECOs from the baseline. The Mess Hall annual energy savings for ECO-1 and ECO-2 are presented in the following table.

Bldg. No.	Computer Simulation	Annual Heating (MBtu)	Annual Cooling (kWh)	Annual Cooling (Convert kWh to MBtu)	Peak Electric Demand (kW)	Annual Heating Savings (MBtu)	Annual Cooling Savings (MBtu)	Peak Electric Demand Savings (kW)
630A (Kitchen)	Baseline	1,888.3	0	-	8.7	-	-	-
	ECO-1	1,848.8	0	-	8.7	39.5	0.0	0
	ECO-2	1,846.7	0	-	8.7	41.6	0.0	0
630B (Dining Room)	Baseline	926.7	39,000	133.1	35.5	-	-	-
	ECO-1	833.2	36,460	124.4	34.0	93.5	8.7	1.5
	ECO-2	829.5	36,340	124.0	34.0	97.2	9.1	1.5
630	ECO-1					**133.0**	**8.7**	**1.5**
	ECO-2					**138.8**	**9.1**	**1.5**

Results of Energy Savings and Economic Analysis

The energy savings and economic analysis for ECO-1 and ECO-2 are presented in Appendix D. The results of the analysis are summarized in the table below.

Item	ECO-1	ECO-2
Annual Electric Energy Savings (MBtu)	8.67	9.08
Annual Electric Demand Savings (kW)	1.5	1.5
Annual Natural Gas Savings (MBtu)	133.01	138.84
Total Annual Cost Savings	$880	$914
Investment Cost	$54,215	$55,748
Savings-to-Investment Ratio (SIR)	0.27	0.28
Simple Payback (yrs)	61.62	61.01

5.6 BUILDING 638 (ADMINISTRATION)

Description of Existing Conditions

Building 638 is a 3,700 sq ft one-story building built in 1956. The building was originally a medical clinic, and has recently been converted to an administration office. The building is occupied from 0730 to 1630 hours on Mondays through Fridays. The administrative facility has approximately 10 personnel.



The building wall construction is 4 in. face brick, air space, and 6 in. concrete masonry block. The roof construction is a built-up roof on a metal roof deck, ceiling air space, 6 in. of fiberglass batt insulation, and a ceiling consisting of a combination of acoustic ceiling tile and plaster. The windows are clear double pane glass in aluminum frames, vertical sliders, and have insulated metal panels in the top one-third of the frames.

The interior office areas have a variety of storage cabinets and tables along the exterior walls. The walls are a combination of painted concrete masonry block and ceramic tile block. The windows have adjustable venetian blinds for window shades.

The lighting in the office areas is provided by 40 watt fluorescent lamps with standard ballasts; lighting in the foyers, toilets, and storage closets is provided by a variety of incandescent lamps.

Building 638 is heated and cooled by a three zone multizone air handling unit (MZU). Cooling is provided by an air-cooled condensing unit serving the MZU. A central steam plant provides steam heat to the MZU.

Existing Baseline Energy Consumption

The baseline energy use for Building 638, reported from the BEACON energy analysis program, is presented on the following page.

ANNUAL BASELINE ENERGY USE

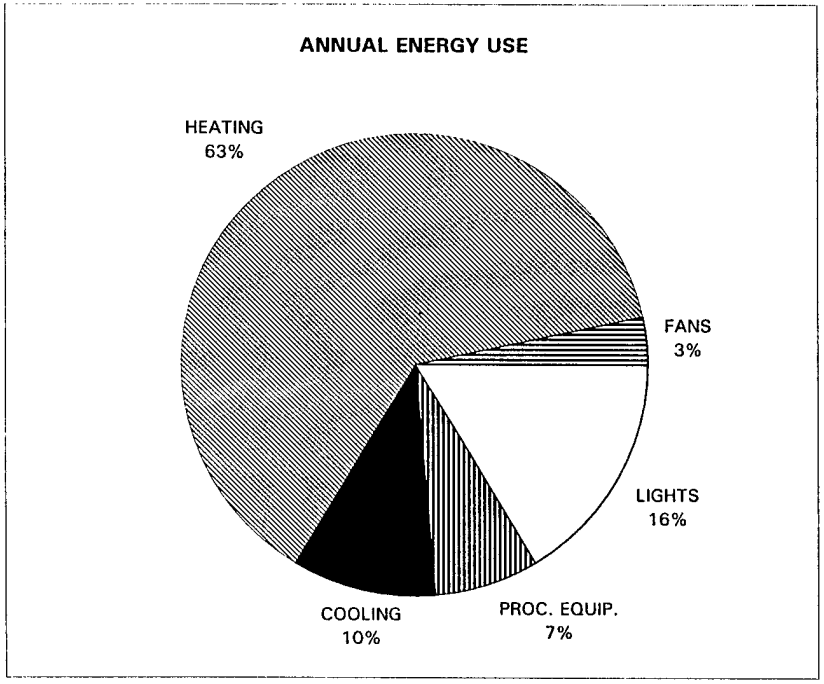
Bldg. No.:	638
Bldg. Name:	Admin. Bldg.

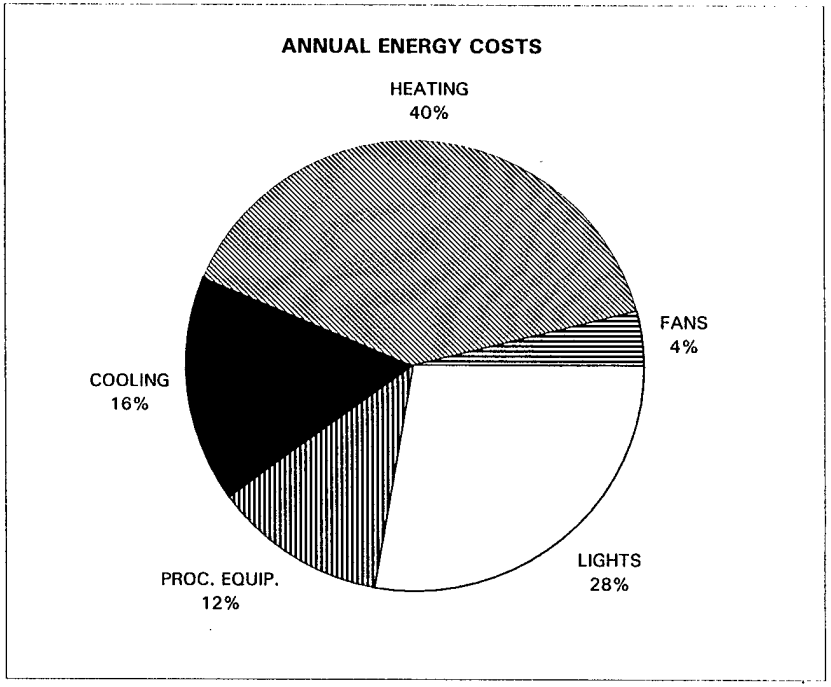
Conditioned Floor Area (Sq Ft):	3,327
Bldg. Energy Use (Btu/Sq Ft):	170,793

ENERGY UNIT COSTS

Electricity	$0.0250	/kWh
Electric Demand	$74.22	/kW/yr
Natural Gas	$5.30	/MBtu

ITEM	ELECTRICITY (kWh)	PEAK ELECTRIC DEMAND (kW)	NATURAL GAS (MBtu)	TOTAL ENERGY USE (MBtu)	ELECTRIC ENERGY COST ($)	ELECTRIC DEMAND COST ($)	NAT. GAS ENERGY COST ($)	TOTAL ENERGY COST ($)
LIGHTS	27,290	8.76		93	682	650	0	1,332
PROC. EQUIP.	11,811	3.79		40	295	281	0	577
COOLING	16,670	4.98		57	417	370	0	787
HEATING			358.9	359	0	0	1,902	1,902
FANS	5,560	0.67		19	139	50	0	189
TOTAL	61,331	18.2	359	568	1,533	1,351	1,902	4,786





Energy Savings Analysis

The building energy baseline was created for Building 638 using the BEACON energy analysis program. Energy simulations for ECO-1 and ECO-2 were generated from the baseline to analyze the addition of fiberglass batt wall insulation and rigid wall insulation, respectively.

The annual energy savings were calculated by subtracting the energy use of the ECOs from the baseline. The annual energy savings for ECO-1 and ECO-2 are presented in the following table.

Bldg. No.	Computer Simulation	Annual Heating (MBtu)	Annual Cooling (kWh)	Annual Cooling (Convert kWh to •MBtu)	Peak Electric Demand (kW)	Annual Heating Savings (MBtu)	Annual Cooling Savings (MBtu)	Peak Electric Demand Savings (kW)
638	Baseline	358.9	16,670	56.9	18.2	-	-	-
	ECO-1	325.8	15,130	51.6	18.2	**33.1**	**5.3**	**0**
	ECO-2	324.1	15,040	51.3	18.2	**34.8**	**5.6**	**0**

Results of Energy Savings and Economic Analysis

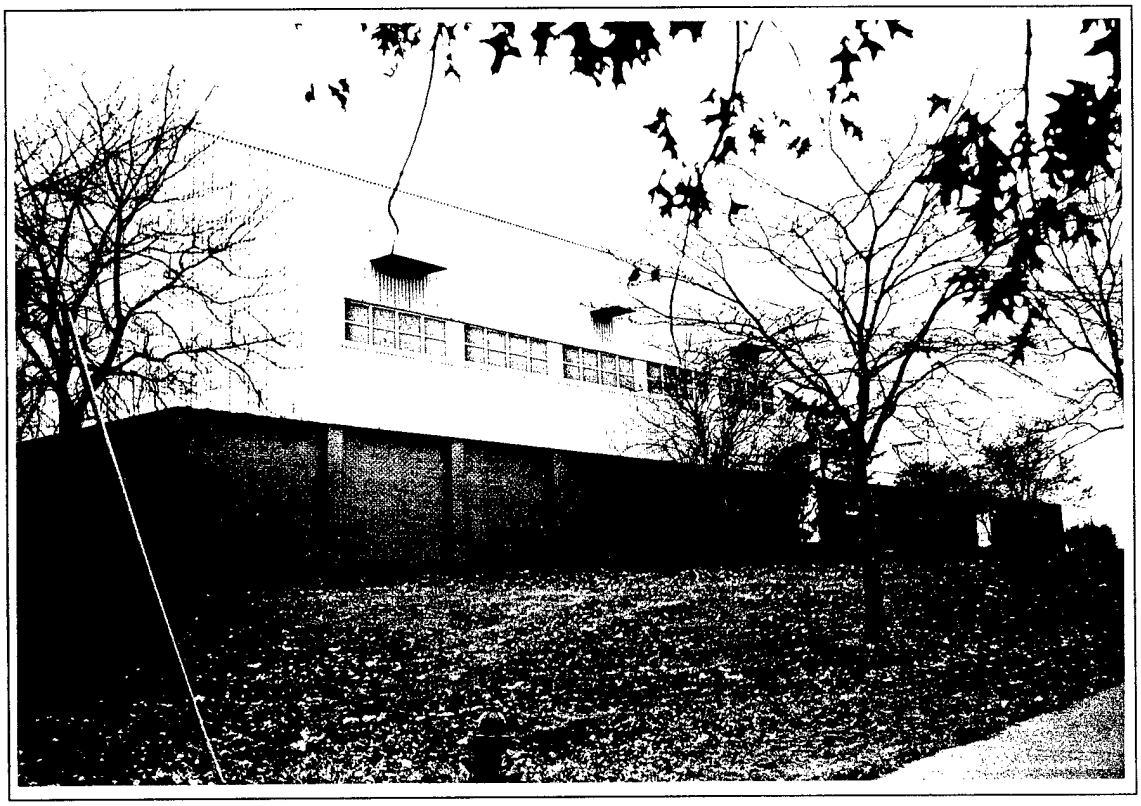
The energy savings and economic analysis for ECO-1 and ECO-2 are presented in Appendix D. The results of the analysis are summarized in the table below.

Item	ECO-1	ECO-2
Annual Electric Energy Savings (MBtu)	5.26	5.56
Annual Electric Demand Savings (kW)	0	0
Annual Natural Gas Savings (MBtu)	33.13	34.81
Total Annual Cost Savings	$214	$225
Investment Cost	$21,565	$21,836
Savings-to-Investment Ratio (SIR)	0.17	0.18
Simple Payback (yrs)	100.72	96.95

5.7 BUILDING 826 (GYMNASIUM)

Description of Existing Conditions

Building 826 is a 20,425 sq ft one-story building built in 1956. The building includes athletic facilities like a basketball court, weight room, two handball courts, and locker rooms. The Gymnasium is open from 0530 to 2000 hours on Mondays through Fridays and from 1300 to 2000 on Saturdays and Sundays. Five military personnel manage the facility and serve approximately 200 people per day.



The building wall construction consists of 4 in. face brick, air space, and 6 in. concrete masonry block on the lower portion of the wall and insulated metal panel on the upper portion of the wall. The roof construction is a built-up roof on 2 in. of rigid insulation, a 2 in. poured gypsum roof deck, and 1 in. form board. The windows are clear double pane glass in aluminum frames and vertical sliders. Most of the windows have been replaced with insulated metal panels.

The athletic facilities in the Gymnasium have unique equipment and furnishings that would impact the installation of insulation on walls. The basketball court area has folding bleachers along the entire north wall. Five movable basketball hoops are attached to the exterior walls, two on each of the north and south walls and one on the west wall. A scoreboard is mounted on the west wall. The lower portion of the walls are painted

concrete masonry block, while the upper portion of the walls are painted metal panels. The weight room contains several types of weight lifting equipment and has interior walls similar to the basketball court area walls. The handball court walls are covered with a hard wood surface. The locker rooms have a combination of painted concrete masonry block and ceramic tile block the interior surface of walls.

The lighting in the basketball court area is provided by 75 watt mercury vapor lamps. The lighting for the weight room and handball courts is provided by 35 watt high pressure sodium lamps. The lighting in the locker rooms, foyer, toilets, and storage closets is provided by 34 watt fluorescent lamps with standard ballasts and 60 watt incandescent lamps.

The Gymnasium is heated by five heating and ventilating units (H&Vs). The locker rooms and foyer have steam unit heaters for auxiliary heat. A central steam plant provides steam heat to the H&Vs and unit heaters. The Gymnasium does not have cooling.

Existing Baseline Energy Consumption

The baseline energy use for the Gymnasium, reported from the BEACON energy analysis program, is presented on the following page.

ANNUAL BASELINE ENERGY USE

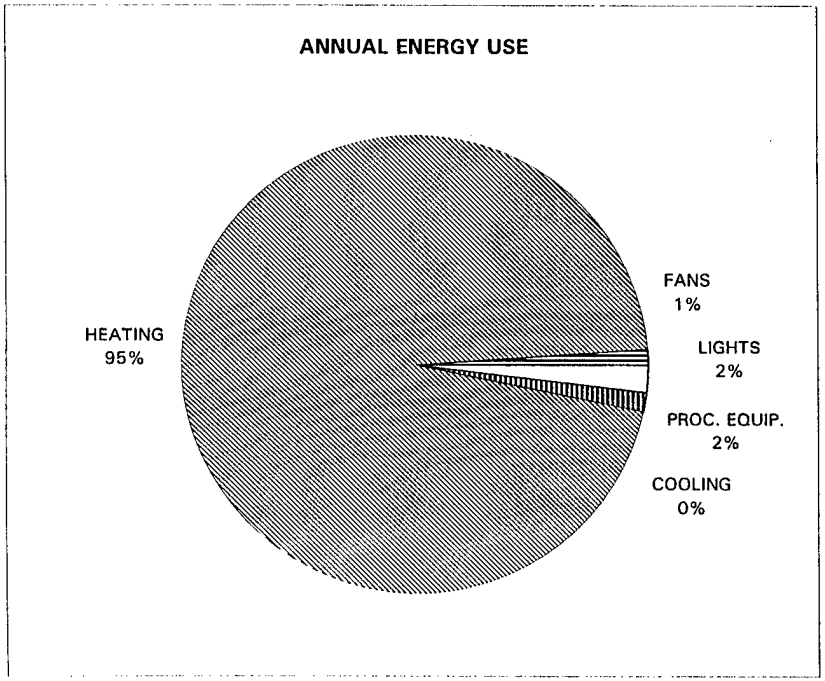
Bldg. No.:	826
Bldg. Name:	Gymnasium

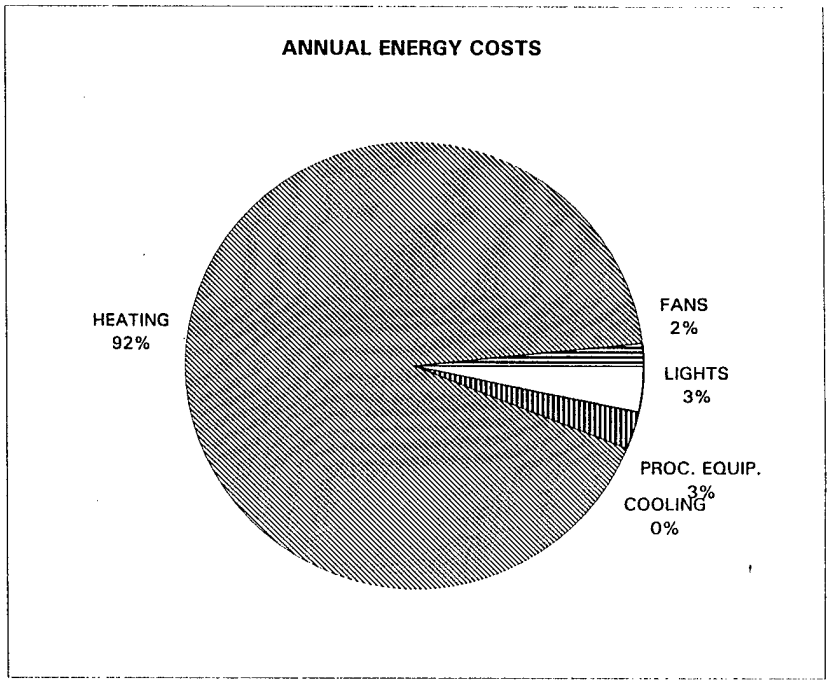
Conditioned Floor Area (Sq Ft):	19,827
Bldg. Energy Use (Btu/Sq Ft):	447,193

ENERGY UNIT COSTS

Electricity	$0.0250	/kWh
Electric Demand	$74.22	/kW/yr
Natural Gas	$5.30	/MBtu

ITEM	ELECTRICITY (kWh)	PEAK ELECTRIC DEMAND (kW)	NATURAL GAS (MBtu)	TOTAL ENERGY USE (MBtu)	ELECTRIC ENERGY COST ($)	ELECTRIC DEMAND COST ($)	NAT. GAS ENERGY COST ($)	TOTAL ENERGY COST ($)
LIGHTS	48,980	5.56		167	1,225	413	0	1,637
PROC. EQUIP.	41,028	4.66		140	1,026	346	0	1,372
COOLING	0	0.00		0	0	0	0	0
HEATING			8,464.2	8,464	0	0	44,860	44,860
FANS	27,860	1.88		95	697	139	0	836
TOTAL	117,868	12.1	8,464.2	8,867	2,947	898	44,860	48,705





Energy Savings Analysis

The building energy baseline was created for the Gymnasium using the BEACON energy analysis program. Energy simulations for ECO-1 and ECO-2 were generated from the baseline to analyze the addition of fiberglass batt wall insulation and rigid wall insulation, respectively.

The annual energy savings were calculated by subtracting the energy use of the ECOs from the baseline. The annual energy savings for ECO-1 and ECO-2 are presented in the following table.

Bldg. No.	Computer Simulation	Annual Heating (MBtu)	Annual Cooling (kWh)	Annual Cooling (Convert kWh to MBtu)	Peak Electric Demand (kW)	Annual Heating Savings (MBtu)	Annual Cooling Savings (MBtu)	Peak Electric Demand Savings (kW)
826	Baseline	8,464.2	0	-	12.1	-	-	-
	ECO-1	8,303.9	0	-	12.1	**160.3**	**0.0**	**0**
	ECO-2	8,297.3	0	-	12.1	**167.0**	**0.0**	**0**

Results of Energy Savings and Economic Analysis

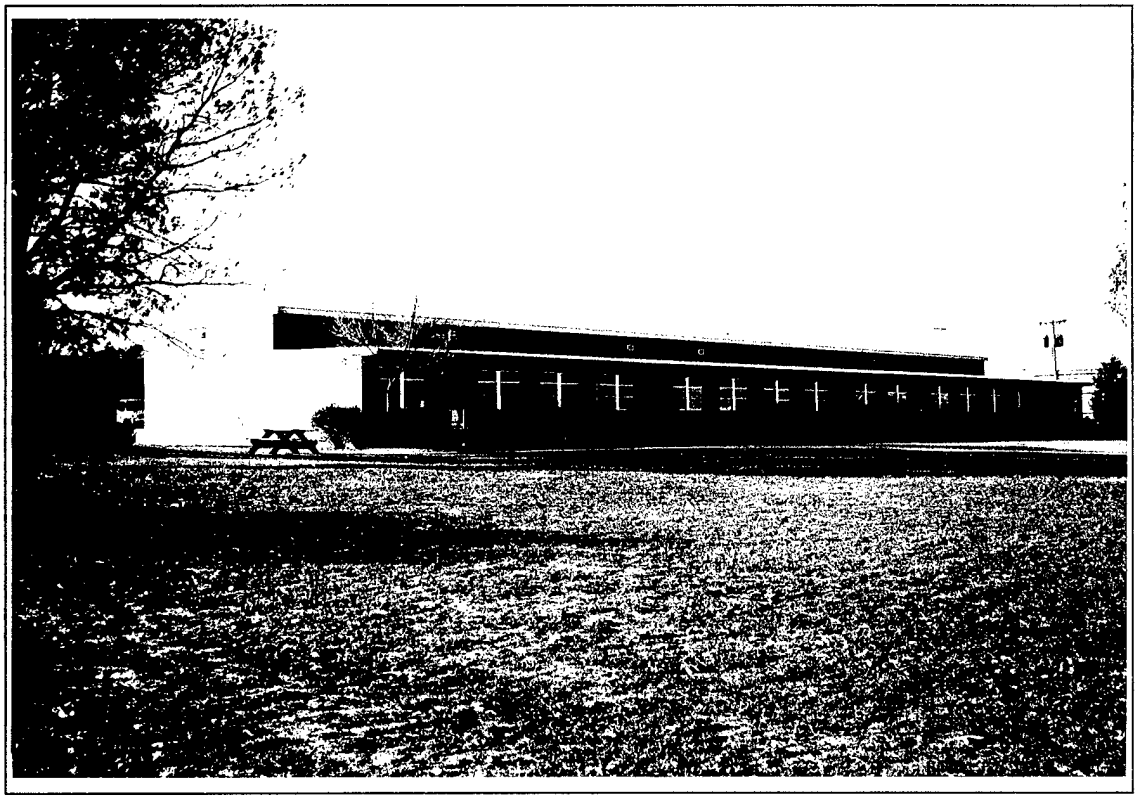
The energy savings and economic analysis for ECO-1 and ECO-2 are presented in Appendix D. The results of the analysis are summarized in the table below.

Item	ECO-1	ECO-2
Annual Electric Energy Savings (MBtu)	0	0
Annual Electric Demand Savings (kW)	0	0
Annual Natural Gas Savings (MBtu)	160.33	166.97
Total Annual Cost Savings	$850	$885
Investment Cost	$129,351	$139,097
Savings-to-Investment Ratio (SIR)	0.12	0.11
Simple Payback (yrs)	152.22	157.18

5.8 BUILDING 655 (ADMINISTRATION & SUPPLY)

Description of Existing Conditions

Building 655 is a 12,134 sq ft one-story building built in 1958. The Administration and Supply building is divided into five units, one unit for each military company. Each unit has an administrative area with five offices and a supply area with an arms vault and storage. The building is occupied from 0800 to 1700 hours on Mondays through Fridays and has approximately 40 personnel.



The building wall construction is 4 in. face brick, air space, and 6 in. concrete masonry block. The roof construction is a built-up roof on 2 in. of rigid insulation, a metal roof deck, a ceiling air space, a hardboard ceiling, a ceiling space, and acoustic tile ceiling in the administration area. The roof construction in the supply area does not have ceiling tile, but has 6 in. of fiberglass batt insulation instead. The windows are clear, double pane glass in aluminum frames, vertical sliders, and have insulated metal panels in the top one-third of the frames.

The interior of the administration areas have walls covered with a decorative jute wall covering. The windows have adjustable venetian blinds for window shades. The interior of the supply areas have painted concrete masonry block walls and a variety of storage containers, cabinets, and metal wire cages.

The lighting is provided by 40 watt fluorescent lamps with standard ballasts throughout the building, except for hallways, foyers, and toilets where lighting is provided by 60 watt and 100 watt incandescent lamps.

The Administration and Supply building is heated throughout by finned-tube baseboard radiation units. A central steam plant provides steam to a steam-to-hot water converter in the mechanical room. The steam-to-hot water converter provides hot water to the finned-tube baseboard radiation units.

Existing Baseline Energy Consumption

The baseline energy use for the Administration and Supply building, reported from the BEACON energy analysis program, is presented on the following page.

ANNUAL BASELINE ENERGY USE

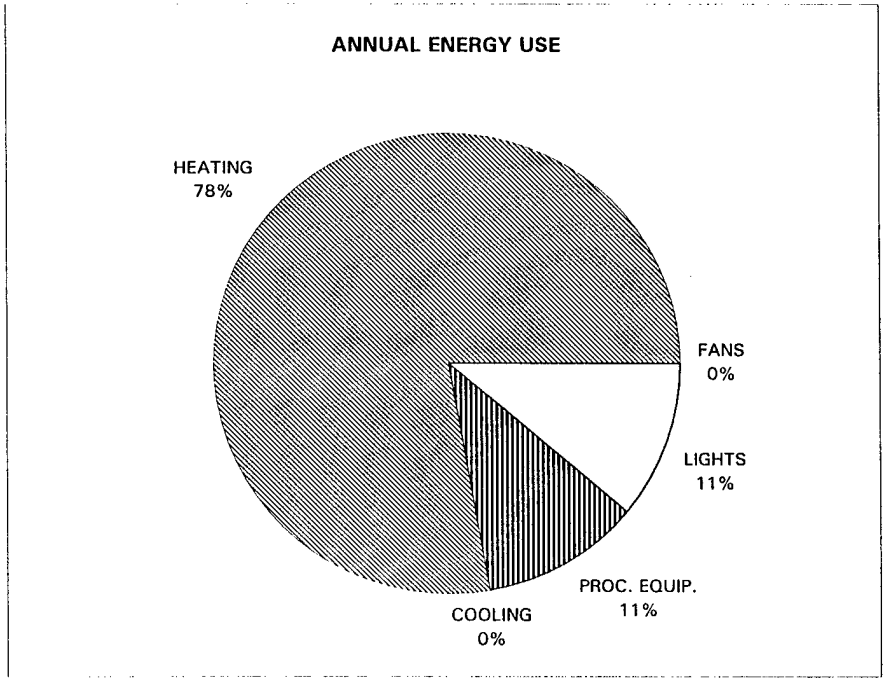
Bldg. No.:	655
Bldg. Name:	Administration/Supply

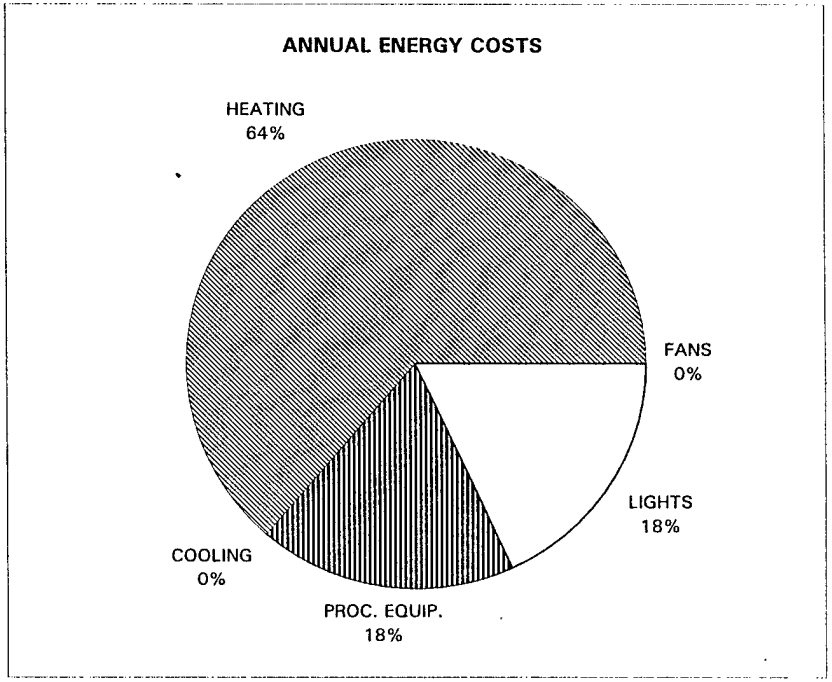
Conditioned Floor Area (Sq Ft):	11,861
Bldg. Energy Use (Btu/Sq Ft):	99,615

ENERGY UNIT COSTS

Electricity	$0.0250	/kWh
Electric Demand	$74.22	/kW/yr
Natural Gas	$5.30	/MBtu

ITEM	ELECTRICITY (kWh)	PEAK ELECTRIC DEMAND (kW)	NATURAL GAS (MBtu)	TOTAL ENERGY USE (MBtu)	ELECTRIC ENERGY COST ($)	ELECTRIC DEMAND COST ($)	NAT. GAS ENERGY COST ($)	TOTAL ENERGY COST ($)
LIGHTS	38,590	5.65		132	965	419	0	1,384
PROC. EQUIP.	38,617	5.65		132	965	419	0	1,385
COOLING	0	0.00		0	0	0	0	0
HEATING			918.1	918	0	0	4,866	4,866
FANS	0	0.00		0	0	0	0	0
TOTAL	77,207	11.3	918.1	1,182	1,930	839	4,866	7,635





Energy Savings Analysis

The building energy baseline was created for the Administration and Supply building using the BEACON energy analysis program. Energy simulations for ECO-1 and ECO-2 were generated from the baseline to analyze the addition of fiberglass batt wall insulation and rigid wall insulation, respectively.

The annual energy savings were calculated by subtracting the energy use of the ECOs from the baseline. The Administration and Supply building annual energy savings for ECO-1 and ECO-2 are presented in the following table.

Bldg. No.	Computer Simulation	Annual Heating (MBtu)	Annual Cooling (kWh)	Annual Cooling (Convert kWh to MBtu)	Peak Electric Demand (kW)	Annual Heating Savings (MBtu)	Annual Cooling Savings (MBtu)	Peak Electric Demand Savings (kW)
655	Baseline	918.1	0	-	11.3	-	-	-
	ECO-1	795.7	0	-	11.3	**122.4**	**0.0**	**0**
	ECO-2	790.2	0	-	11.3	**127.9**	**0.0**	**0**

Results of Energy Savings and Economic Analysis

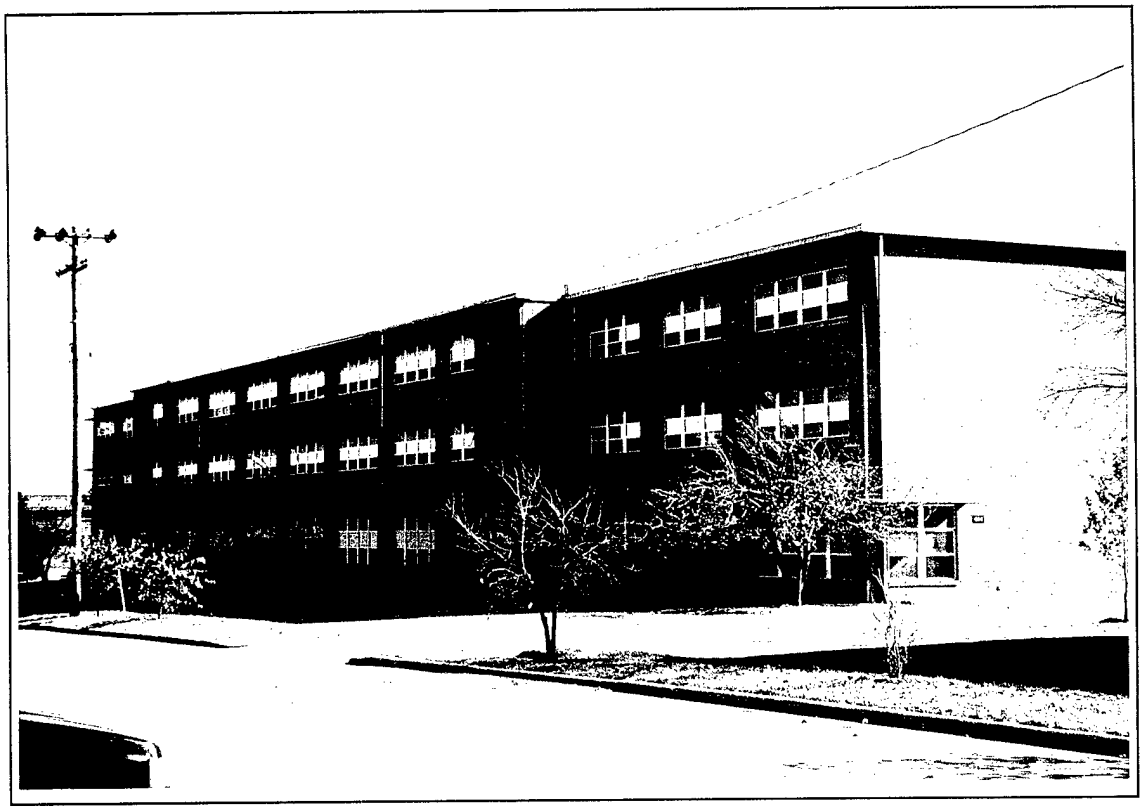
The energy savings and economic analysis for ECO-1 and ECO-2 are presented in Appendix D. The results of the analysis are summarized in the table below.

Item	ECO-1	ECO-2
Annual Electric Energy Savings (MBtu)	0	0
Annual Electric Demand Savings (kW)	0	0
Annual Natural Gas Savings (MBtu)	122.39	127.89
Total Annual Cost Savings	$649	$678
Investment Cost	$50,994	$52,484
Savings-to-Investment Ratio (SIR)	0.23	0.23
Simple Payback (yrs)	78.61	77.43

5.9 BUILDING 651 (BARRACKS WITH A/C)

Description of Existing Conditions

Building 651 is a 40,990 sq ft three-story building built in 1957. The barracks building is open 24 hours a day, seven days a week, and has approximately 125 occupants.



The building wall construction is 4 in. face brick, air space, and a combination of 4 in. and 9 in. concrete masonry block. The roof construction is a built-up roof on 2 in. of rigid insulation and a 7 in. concrete roof deck. The windows are clear double pane glass in aluminum frames, vertical sliders, and have insulated metal panels in the top one-third of the frames.

The interior walls are painted concrete masonry block, with the exception of the latrines, laundry, and stairwells where the walls are a combination of painted concrete masonry block and ceramic tile block. The windows do not have shades, but have a plastic film applied to them to obscure the light.

The lighting is provided by 34 watt fluorescent lamps with standard ballasts throughout the building, except for the latrines and storage closets where lighting is provided by 60 watt incandescent lamps.

The barracks building is heated throughout by finned-tube baseboard radiation units. A central steam plant provides steam to a steam-to-hot water converter in the mechanical room. The steam-to-hot water converter provides hot water to the finned-tube baseboard radiation units. The barracks building is cooled by two variable air volume air handling units (VAV AHUs). The VAV AHUs were installed in 1974 as part of a barracks modernization program. Cooling is provided by a central chilled water plant and is pumped to the VAV AHUs serving the barracks.

Existing Baseline Energy Consumption

The baseline energy use for the barracks building, reported from the BEACON energy analysis program, is presented on the following page.

ANNUAL BASELINE ENERGY USE

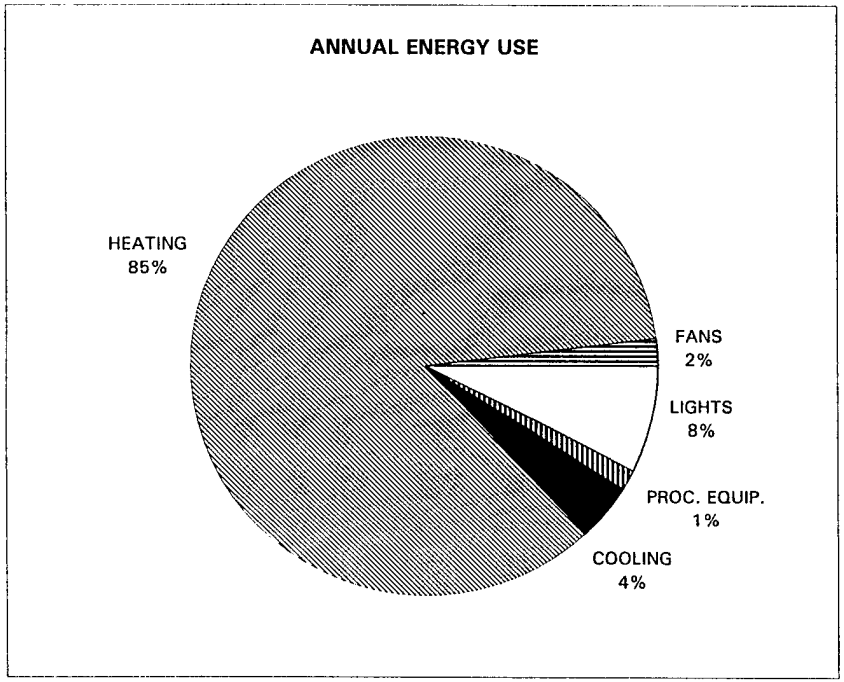
Bldg. No.:	651
Bldg. Name:	Barracks, with A/C

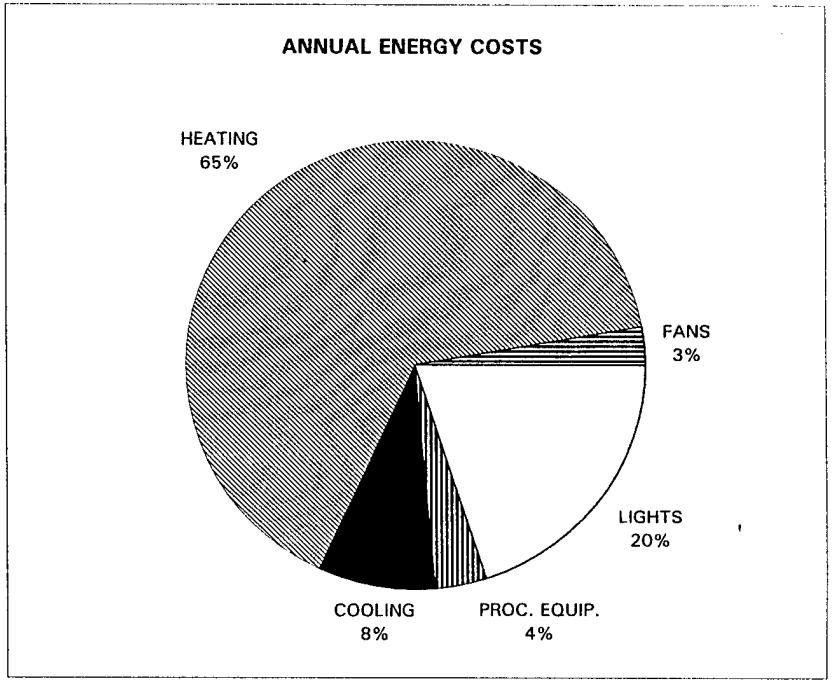
Conditioned Floor Area (Sq Ft):	40,990
Bldg. Energy Use (Btu/Sq Ft):	107,585

ENERGY UNIT COSTS

Electricity	$0.0250	/kWh
Electric Demand	$74.22	/kW/yr
Natural Gas	$5.30	/MBtu

ITEM	ELECTRICITY (kWh)	PEAK ELECTRIC DEMAND (kW)	NATURAL GAS (MBtu)	TOTAL ENERGY USE (MBtu)	ELECTRIC ENERGY COST ($)	ELECTRIC DEMAND COST ($)	NAT. GAS ENERGY COST ($)	TOTAL ENERGY COST ($)
LIGHTS	97,000	49.53		331	2,425	3,676	0	6,101
PROC. EQUIP.	17,633	9.00		60	441	668	0	1,109
COOLING	52,400	15.58		179	1,310	1,157	0	2,467
HEATING			3,754.2	3,754	0	0	19,897	19,897
FANS	24,960	2.99		85	624	222	0	846
TOTAL	191,993	77.1	3,754.2	4,409	4,800	5,722	19,897	30,419





Energy Savings Analysis

The building energy baseline was created for the barracks building using the BEACON energy analysis program. Energy simulations for ECO-1 and ECO-2 were generated from the baseline to analyze the addition of fiberglass batt wall insulation and rigid wall insulation, respectively.

The annual energy savings were calculated by subtracting the energy use of the ECOs from the baseline. The barracks building annual energy savings for ECO-1 and ECO-2 are presented in the following table.

Bldg. No.	Computer Simulation	Annual Heating (MBtu)	Annual Cooling (kWh)	Annual Cooling (Convert kWh to MBtu)	Peak Electric Demand (kW)	Annual Heating Savings (MBtu)	Annual Cooling Savings (MBtu)	Peak Electric Demand Savings (kW)
651	Baseline	3,754.2	52,400	178.8	77.1	-	-	-
	ECO-1	3,418.9	47,060	160.6	72.6	**335.3**	**18.2**	**4.5**
	ECO-2	3,399.5	46,740	159.5	72.4	**354.7**	**19.3**	**4.7**

Results of Energy Savings and Economic Analysis

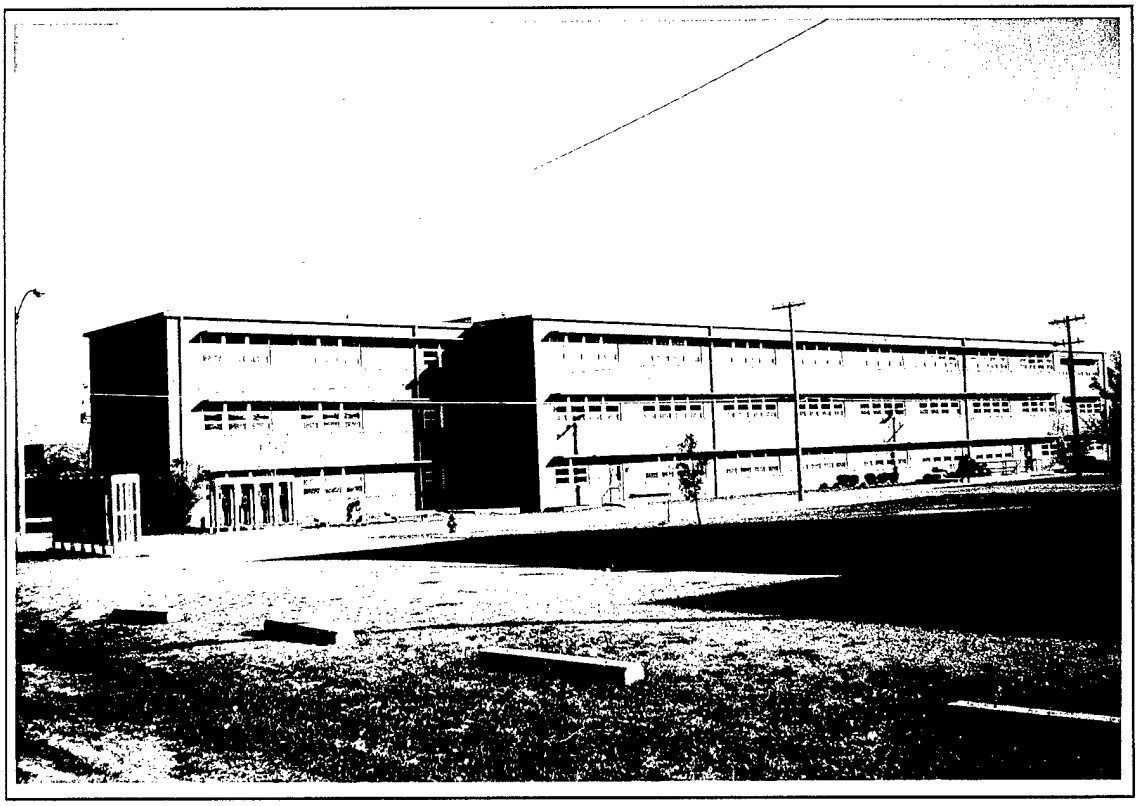
The energy savings and economic analysis for ECO-1 and ECO-2 are presented in Appendix D. The results of the analysis are summarized in the table below.

Item	ECO-1	ECO-2
Annual Electric Energy Savings (MBtu)	18.23	19.32
Annual Electric Demand Savings (kW)	4.5	4.7
Annual Natural Gas Savings (MBtu)	335.28	354.66
Total Annual Cost Savings	$2,245	$2,370
Investment Cost	$176,620	$181,928
Savings-to-Investment Ratio (SIR)	0.21	0.22
Simple Payback (yrs)	78.69	76.76

5.10 BUILDING 730 (BARRACKS WITHOUT A/C)

Description of Existing Conditions

Building 730 is a 40,640 sq ft three-story building built in 1957. The barracks building is open 24 hours a day, seven days a week, and has approximately 125 occupants.



The building wall construction is 4 in. face brick, air space, and a combination of 4 in. and 9 in. concrete masonry block. The roof construction is a built-up roof on 2 in. of rigid insulation and a 7 in. concrete roof deck. The windows are clear double pane glass in aluminum frames, vertical sliders, and have insulated metal panels in the top one-third of the frames.

The interior walls are painted concrete masonry block, with the exception of the latrines, laundry, and stairwells where the walls are a combination of painted concrete masonry block and ceramic tile block. The windows do not have shades, but have a plastic film applied to them to obscure the light.

The lighting is provided by 34 watt fluorescent lamps with standard ballasts throughout the building, except for the latrines and storage closets where lighting is provided by 60 watt incandescent lamps.

The barracks building is heated throughout by finned-tube baseboard radiation units. A central steam plant provides steam to a steam-to-hot water converter in the mechanical room. The steam-to-hot water converter provides hot water to the finned-tube baseboard radiation units. The barracks building does not have cooling.

Existing Baseline Energy Consumption

The baseline energy use for the barracks building, reported from the BEACON energy analysis program, is presented on the following page.

ANNUAL BASELINE ENERGY USE

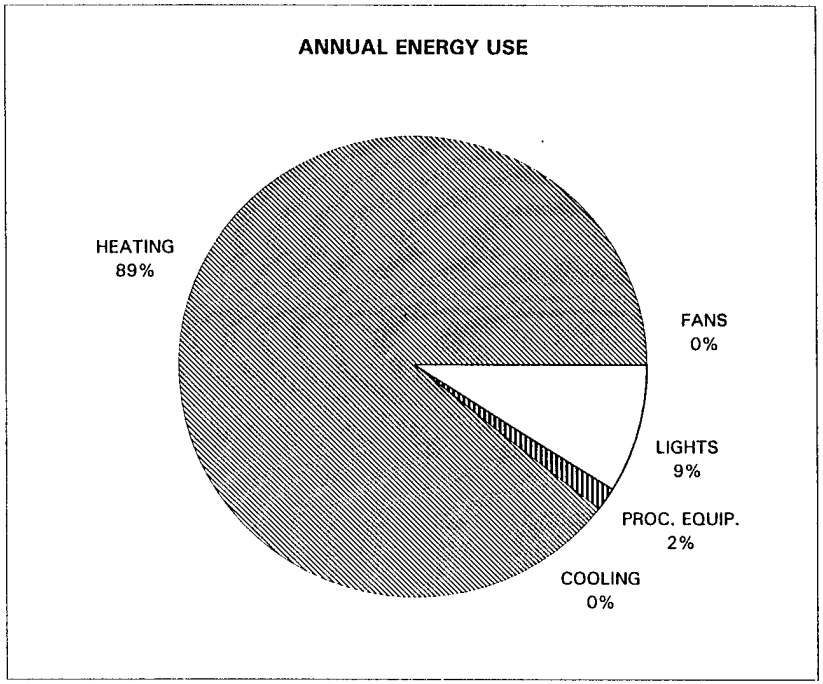
Bldg. No.:	730
Bldg. Name:	Barracks, w/o A/C

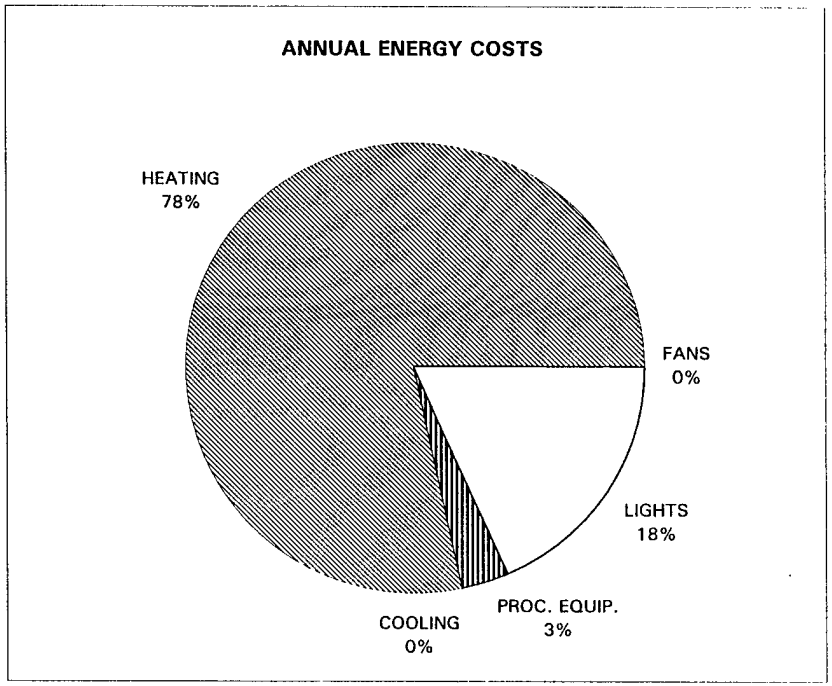
Conditioned Floor Area (Sq Ft):	40,640
Bldg. Energy Use (Btu/Sq Ft):	83,962

ENERGY UNIT COSTS

Electricity	$0.0250	/kWh
Electric Demand	$74.22	/kW/yr
Natural Gas	$5.30	/MBtu

ITEM	ELECTRICITY (kWh)	PEAK ELECTRIC DEMAND (kW)	NATURAL GAS (MBtu)	TOTAL ENERGY USE (MBtu)	ELECTRIC ENERGY COST ($)	ELECTRIC DEMAND COST ($)	NAT. GAS ENERGY COST ($)	TOTAL ENERGY COST ($)
LIGHTS	89,950	21.10		307	2,249	1,566	0	3,815
PROC. EQUIP.	17,633	3.10		60	441	230	0	671
COOLING	0	0.00		0	0	0	0	0
HEATING			3,074	3,074	0	0	16,293	16,293
FANS	0	0.00		0	0	0	0	0
TOTAL	107,583	24.2	3,074	3,441	2,690	1,796	16,293	20,778





Energy Savings Analysis

The building energy baseline was created for the barracks building using the BEACON energy analysis program. Energy simulations for ECO-1 and ECO-2 were generated from the baseline to analyze the addition of fiberglass batt wall insulation and rigid wall insulation, respectively.

The annual energy savings were calculated by subtracting the energy use of the ECOs from the baseline. The barracks building annual energy savings for ECO-1 and ECO-2 are presented in the following table.

Bldg. No.	Computer Simulation	Annual Heating (MBtu)	Annual Cooling (kWh)	Annual Cooling (Convert kWh to MBtu)	Peak Electric Demand (kW)	Annual Heating Savings (MBtu)	Annual Cooling Savings (MBtu)	Peak Electric Demand Savings (kW)
730	Baseline	3,074.1	0	-	24.2	-	-	-
	ECO-1	2,812.4	0	-	24.2	**261.7**	**0.0**	**0**
	ECO-2	2,795.2	0	-	24.2	**278.9**	**0.0**	**0**

Results of Energy Savings and Economic Analysis

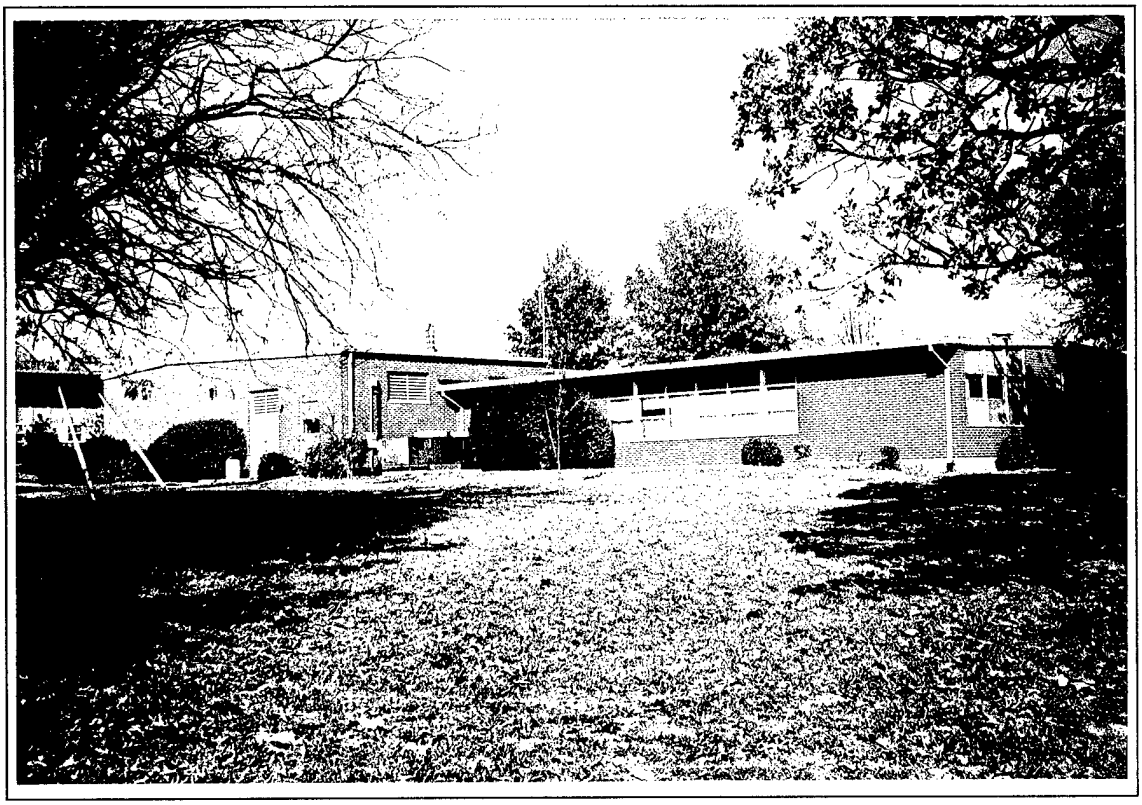
The energy savings and economic analysis for ECO-1 and ECO-2 are presented in Appendix D. The results of the analysis are summarized in the table below.

Item	ECO-1	ECO-2
Annual Electric Energy Savings (MBtu)	0	0
Annual Electric Demand Savings (kW)	0	0
Annual Natural Gas Savings (MBtu)	261.73	278.90
Total Annual Cost Savings	$1,387	$1,478
Investment Cost	$178,577	$183,884
Savings-to-Investment Ratio (SIR)	0.14	0.14
Simple Payback (yrs)	128.73	124.40

5.11 BUILDING 625 (BATTALION HEADQUARTERS)

Description of Existing Conditions

Building 625 is a 6,163 sq ft one-story building built in 1963. The Battalion Headquarters has administrative offices and classrooms with approximately 50 personnel using the facility daily. The building is occupied from 0700 to 1700 hours on Mondays through Fridays, and has three assigned personnel from 0800 to 1600 on Saturdays and Sundays.



The building wall construction is 4 in. face brick, air space, and 6 in. concrete masonry block. The roof construction is a built-up roof on 1 in. of rigid insulation, a metal roof deck, ceiling air space, 6 in. of fiberglass batt insulation, and acoustic ceiling tile. The windows are clear double pane glass in aluminum frames, vertical sliders, and have insulated metal panels in the top one-third of the frames.

The interior office and classroom area walls are painted concrete masonry block. The office areas have miscellaneous storage cabinets and shelves along the walls. The classroom has wall-mounted television sets along the west wall and a pull-down movie screen along the south wall. The windows in the office area have cloth draperies for window shades; and the windows in the classroom have adjustable venetian blinds for window shades.

The lighting in the office areas and classroom is provided by 34 watt fluorescent lamps with standard ballasts; lighting in the latrines and storage closets is provided by 60 watt incandescent lamps.

The Battalion Headquarters is heated and cooled a five zone multizone air handling unit (MZU). It is also heated by finned-tube baseboard radiation units. Cooling is provided by an air-cooled condensing unit. A central steam plant provides steam to a steam-to-hot water converter in the mechanical room. The steam-to-hot water converter provides hot water to the MZU and the finned-tube baseboard radiation units.

Existing Baseline Energy Consumption

The baseline energy use for the Battalion Headquarters, reported from the BEACON energy analysis program, is presented on the following page.

ANNUAL BASELINE ENERGY USE

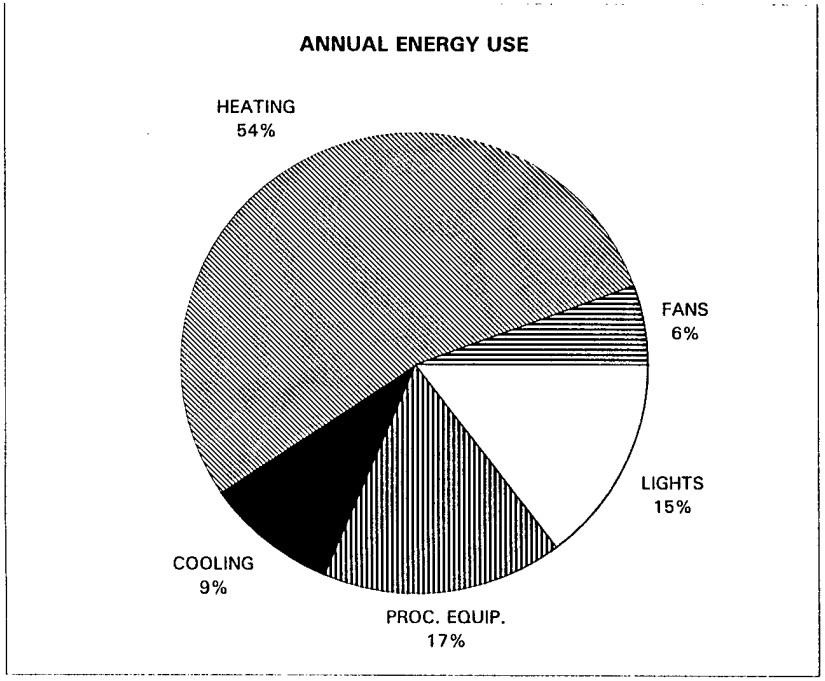
Bldg. No.:	625
Bldg. Name:	Battalion HQ

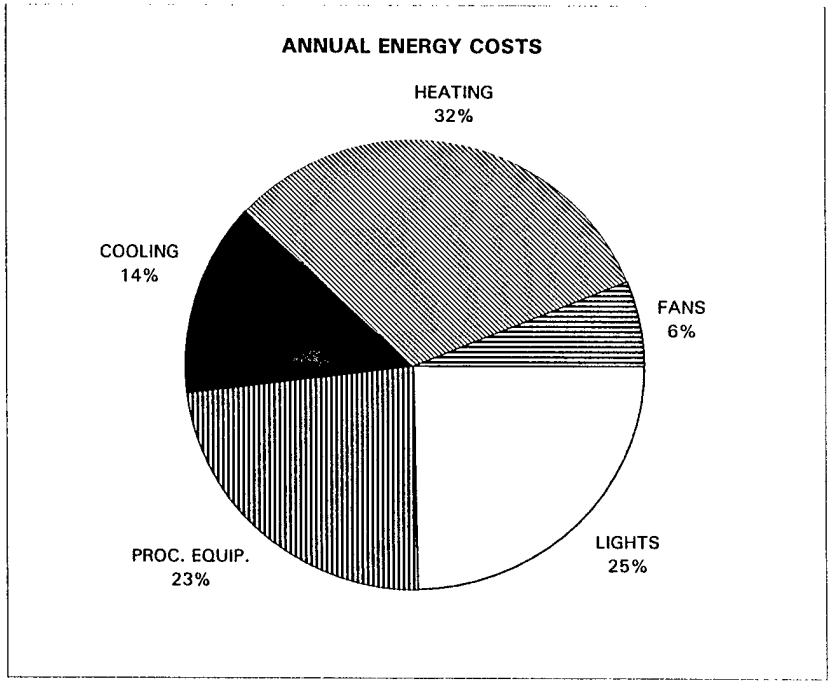
Conditioned Floor Area (Sq Ft):	5,795
Bldg. Energy Use (Btu/Sq Ft):	153,870

ENERGY UNIT COSTS

Electricity	$0.0250	/kWh
Electric Demand	$74.22	/kW/yr
Natural Gas	$5.30	/MBtu

ITEM	ELECTRICITY (kWh)	PEAK ELECTRIC DEMAND (kW)	NATURAL GAS (MBtu)	TOTAL ENERGY USE (MBtu)	ELECTRIC ENERGY COST ($)	ELECTRIC DEMAND COST ($)	NAT. GAS ENERGY COST ($)	TOTAL ENERGY COST ($)
LIGHTS	38,540	13.57		132	964	1,007	0	1,971
PROC. EQUIP.	43,498	10.53		148	1,087	782	0	1,869
COOLING	23,720	7.14		81	593	530	0	1,123
HEATING			481.1	481	0	0	2,550	2,550
FANS	14,550	1.76		50	364	131	0	494
TOTAL	120,308	33.0	481.1	892	3,008	2,449	2,550	8,007





Energy Savings Analysis

The building energy baseline was created for the Battalion Headquarters using the BEACON energy analysis program. Energy simulations for ECO-1 and ECO-2 were generated from the baseline to analyze the addition of fiberglass batt wall insulation and rigid wall insulation, respectively.

The annual energy savings were calculated by subtracting the energy use of the ECOs from the baseline. The Battalion Headquarters annual energy savings for ECO-1 and ECO-2 are presented in the following table.

Bldg. No.	Computer Simulation	Annual Heating (MBtu)	Annual Cooling (kWh)	Annual Cooling (Convert kWh to MBtu)	Peak Electric Demand (kW)	Annual Heating Savings (MBtu)	Annual Cooling Savings (MBtu)	Peak Electric Demand Savings (kW)
625	Baseline	481.1	23,720	81.0	33.0	-	-	-
	ECO-1	413.6	21,580	73.7	33.0	**67.5**	**7.3**	**0**
	ECO-2	410.6	21,450	73.2	33.0	**70.5**	**7.7**	**0**

One building in this group had significant differences in interior furnishings and equipment, requiring separate construction costs in addition to the representative building construction costs. This building and its significant difference is noted as follows:

- Building 631 (Data Processing Center - formerly a Battalion Headquarters) - Computer processing equipment and fire suppression systems require relocation.

Results of Energy Savings and Economic Analysis

The energy savings and economic analysis for ECO-1 and ECO-2 are presented in Appendix D. The results of the analysis are summarized in the table below.

Item	ECO-1	ECO-2
Annual Electric Energy Savings (MBtu)	7.30	7.75
Annual Electric Demand Savings (kW)	0	0
Annual Natural Gas Savings (MBtu)	67.50	70.48
Total Annual Cost Savings	$411	$430
Investment Cost	$37,132	$38,019
Savings-to-Investment Ratio (SIR)	0.19	0.20
Simple Payback (yrs)	90.30	88.35

6. SUMMARY AND RECOMMENDATIONS

6.1 SUMMARY

The 100 buildings in this study were divided into ten groups on the basis of similar building use and function, with one representative building designated per group. The ten representative buildings were evaluated for two energy conservation opportunities (ECOs) each. ECO-1 represents the installation of fiberglass batt wall insulation, and ECO-2 represents the installation of rigid wall insulation. Energy savings, construction costs, and life cycle cost analyses (LCCAs) were calculated for each ECO.

The annual energy savings for the representative buildings were extrapolated to similar buildings in each building group. The extrapolation was performed on a square foot basis. Likewise, the construction costs were extrapolated to similar buildings in each building group.

Building 1026, a Branch PX, was built in 1985. Its wall insulation consists of 8 inch concrete masonry blocks with loose fill insulation in the cores and 2.5 inches of rigid insulation. The roof construction includes 4 inches of rigid insulation. Building 1026 was eliminated from the energy analysis because the insulation in the walls and roof well exceed the optimum thicknesses for insulation.

The economic summary for ECO-1 and ECO-2 is presented in Table 6-1 beginning on page 6-2. This table ranks the ECOs from highest to lowest savings-to-investment ratio (SIR). The highest SIR calculated is 0.47 with a 35.5 year Simple Payback for Building 637, a Chapel building.

6.2 RECOMMENDATIONS

The ECOs presented in Table 6-1 have SIRs less than 1.25 and Simple Paybacks greater than 10 years. These ECOS do not qualify for funding under the Energy Conservation Implementation Program (ECIP) and, therefore, are not recommended for implementation.

TABLE 6-1
ECONOMIC SUMMARY OF ECOs - RANKED BY SIR

BLDG NO.	BLDG NAME	BUILDING AREA (SF)	ECO NO.	NAT. GAS ENERGY SAVINGS (MBtu/yr)	ELEC. ENERGY SAVINGS (MBtu/yr)	TOTAL ENERGY SAVINGS (MBtu/yr)	ELEC. DEMAND SAVINGS (kW)	NAT. GAS COST SAVINGS ($/yr)	ELEC. COST SAVINGS ($/yr)	ELEC. DEMAND COST SAVINGS ($/yr)	TOTAL ENERGY COST SAVINGS ($/yr)	TOTAL INVESTMENT ($)	DISCOUNTED SAVINGS ($)	SIMPLE PAYBACK (yrs)	SIR
637	Chapel	8,949	ECO 1	229.45	35.97	265.42	2.70	$1,216	$263	$200	$1,680	$59,688	$27,931	35.53	0.47
742	Chapel	8,949	ECO 1	229.45	35.97	265.42	2.70	$1,216	$263	$200	$1,680	$59,688	$27,931	35.53	0.47
843	Chapel	8,890	ECO 1	227.94	35.74	263.67	2.68	$1,208	$262	$199	$1,669	$59,295	$27,747	35.53	0.47
637	Chapel	8,949	ECO 2	232.76	37.24	270.00	2.80	$1,234	$273	$208	$1,714	$63,708	$28,470	37.17	0.45
742	Chapel	8,949	ECO 2	232.76	37.24	270.00	2.80	$1,234	$273	$208	$1,714	$63,708	$28,470	37.17	0.45
843	Chapel	8,890	ECO 2	231.23	36.99	268.22	2.78	$1,225	$271	$206	$1,703	$63,288	$28,282	37.17	0.45
639	Branch PX	5,413	ECO 1	49.11	8.26	57.37	1.30	$260	$60	$96	$417	$22,547	$6,757	54.04	0.30
835	Branch PX	6,240	ECO 1	56.61	9.52	66.13	1.50	$300	$70	$111	$481	$25,992	$7,789	54.04	0.30
835	Branch PX	6,240	ECO 2	60.00	10.27	70.27	1.50	$318	$75	$111	$504	$28,015	$8,183	55.54	0.29
639	Branch PX	5,413	ECO 2	52.05	8.91	60.96	1.30	$276	$65	$96	$438	$24,302	$7,099	55.54	0.29
630	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
632	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
653	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
657	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
735	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
739	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
749	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
754	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
820	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
821	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
836	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
837	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
1010	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
1011	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
1027	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	$736	$66	$111	$914	$55,748	$15,485	61.02	0.28
630	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
632	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
653	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
657	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
735	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
739	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
749	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
754	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
820	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
821	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
836	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
837	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
1010	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
1011	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27
1027	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	$705	$63	$111	$880	$54,215	$14,895	61.63	0.27

TABLE 6-1
ECONOMIC SUMMARY OF ECOs - RANKED BY SIR

BLDG NO.	BLDG NAME	BUILDING AREA (SF)	ECO NO.	NAT. GAS ENERGY SAVINGS (MBtu/yr)	ELEC. ENERGY SAVINGS (MBtu/yr)	TOTAL ENERGY SAVINGS (MBtu/yr)	ELEC. DEMAND SAVINGS (kW)	NAT. GAS COST SAVINGS ($/yr)	ELEC. COST SAVINGS ($/yr)	ELEC. DEMAND COST SAVINGS ($/yr)	TOTAL ENERGY COST SAVINGS ($/yr)	TOTAL INVESTMENT ($)	DISCOUNTED SAVINGS ($)	SIMPLE PAYBACK (yrs)	SIR
744	Branch PX	6,240	ECO 1	56.61	9.52	66.13	1.50	$300	$70	$111	$481	$29,219	$7,789	60.75	0.27
744	Branch PX	6,240	ECO 2	60.00	10.27	70.27	1.50	$318	$75	$111	$504	$30,958	$8,183	61.38	0.26
626	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
733	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
734	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
751	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
752	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
823	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
824	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
840	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
841	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
1006	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
1007	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
1025	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	$679	$0	$0	$679	$52,575	$12,059	77.43	0.23
633	Administration/Supply	12,134	ECO 2	127.89	0.00	127.89	0.00	$678	$0	$0	$678	$52,484	$12,038	77.43	0.23
655	Administration/Supply	12,134	ECO 2	127.89	0.00	127.89	0.00	$678	$0	$0	$678	$52,484	$12,038	77.43	0.23
656	Administration/Supply	12,134	ECO 2	127.89	0.00	127.89	0.00	$678	$0	$0	$678	$52,484	$12,038	77.43	0.23
626	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
733	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
734	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
751	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
752	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
823	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
824	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
840	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
841	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
1006	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
1007	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
1025	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	$650	$0	$0	$650	$51,082	$11,540	78.61	0.23
633	Administration/Supply	12,134	ECO 1	122.39	0.00	122.39	0.00	$649	$0	$0	$649	$50,994	$11,520	78.61	0.23
655	Administration/Supply	12,134	ECO 1	122.39	0.00	122.39	0.00	$649	$0	$0	$649	$50,994	$11,520	78.61	0.23
656	Administration/Supply	12,134	ECO 1	122.39	0.00	122.39	0.00	$649	$0	$0	$649	$50,994	$11,520	78.61	0.23
627	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	$1,864	$140	$346	$2,350	$180,374	$39,692	76.76	0.22
628	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	$1,864	$140	$346	$2,350	$180,374	$39,692	76.76	0.22
629	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	$1,864	$140	$346	$2,350	$180,374	$39,692	76.76	0.22
634	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	$1,880	$141	$349	$2,370	$181,928	$40,034	76.76	0.22
635	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	$1,880	$141	$349	$2,370	$181,928	$40,034	76.76	0.22
651	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	$1,880	$141	$349	$2,370	$181,928	$40,034	76.76	0.22
652	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	$1,880	$141	$349	$2,370	$181,928	$40,034	76.76	0.22
654	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	$1,880	$141	$349	$2,370	$181,928	$40,034	76.76	0.22

TABLE 6-1
ECONOMIC SUMMARY OF ECOs - RANKED BY SIR

BLDG NO.	BLDG NAME	BUILDING AREA (SF)	ECO NO.	NAT. GAS ENERGY SAVINGS (MBtu/yr)	ELEC. ENERGY SAVINGS (MBtu/yr)	TOTAL ENERGY SAVINGS (MBtu/yr)	ELEC. DEMAND SAVINGS (kW)	NAT. GAS COST SAVINGS ($/yr)	ELEC. COST SAVINGS ($/yr)	ELEC. DEMAND COST SAVINGS ($/yr)	TOTAL ENERGY COST SAVINGS ($/yr)	TOTAL INVESTMENT ($)	DISCOUNTED SAVINGS ($)	SIMPLE PAYBACK (yrs)	SIR
659	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	$1,880	$141	$349	$2,370	$181,928	$40,034	76.76	0.22
660	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	$1,880	$141	$349	$2,370	$181,928	$40,034	76.76	0.22
1012	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	$1,864	$140	$346	$2,350	$180,374	$39,692	76.76	0.22
1013	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	$1,864	$140	$346	$2,350	$180,374	$39,692	76.76	0.22
1014	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	$1,864	$140	$346	$2,350	$180,374	$39,692	76.76	0.22
1015	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	$1,864	$140	$346	$2,350	$180,374	$39,692	76.76	0.22
1016	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	$1,864	$140	$346	$2,350	$180,374	$39,692	76.76	0.22
1028	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	$1,864	$140	$346	$2,350	$180,374	$39,692	76.76	0.22
1029	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	$1,864	$140	$346	$2,350	$180,374	$39,692	76.76	0.22
627	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	$1,762	$132	$331	$2,225	$175,112	$37,576	78.69	0.21
628	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	$1,762	$132	$331	$2,225	$175,112	$37,576	78.69	0.21
629	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	$1,762	$132	$331	$2,225	$175,112	$37,576	78.69	0.21
634	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	$1,777	$133	$334	$2,244	$176,620	$37,899	78.69	0.21
635	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	$1,777	$133	$334	$2,244	$176,620	$37,899	78.69	0.21
651	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	$1,777	$133	$334	$2,244	$176,620	$37,899	78.69	0.21
652	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	$1,777	$133	$334	$2,244	$176,620	$37,899	78.69	0.21
654	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	$1,777	$133	$334	$2,244	$176,620	$37,899	78.69	0.21
659	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	$1,777	$133	$334	$2,244	$176,620	$37,899	78.69	0.21
660	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	$1,777	$133	$334	$2,244	$176,620	$37,899	78.69	0.21
1012	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	$1,762	$132	$331	$2,225	$175,112	$37,576	78.69	0.21
1013	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	$1,762	$132	$331	$2,225	$175,112	$37,576	78.69	0.21
1014	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	$1,762	$132	$331	$2,225	$175,112	$37,576	78.69	0.21
1015	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	$1,762	$132	$331	$2,225	$175,112	$37,576	78.69	0.21
1016	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	$1,762	$132	$331	$2,225	$175,112	$37,576	78.69	0.21
1028	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	$1,762	$132	$331	$2,225	$175,112	$37,576	78.69	0.21
1029	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	$1,762	$132	$331	$2,225	$175,112	$37,576	78.69	0.21
625	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
631	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
650	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
658	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
732	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
740	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
750	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
753	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
822	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
825	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
838	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
842	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
1008	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
1009	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20

TABLE 6-1
ECONOMIC SUMMARY OF ECOs - RANKED BY SIR

BLDG NO.	BLDG NAME	BUILDING AREA (SF)	ECO NO.	NAT. GAS ENERGY SAVINGS (MBtu/yr)	ELEC. ENERGY SAVINGS (MBtu/yr)	TOTAL ENERGY SAVINGS (MBtu/yr)	ELEC. DEMAND SAVINGS (kW)	NAT. GAS COST SAVINGS ($/yr)	ELEC. COST SAVINGS ($/yr)	ELEC. DEMAND COST SAVINGS ($/yr)	TOTAL ENERGY COST SAVINGS ($/yr)	TOTAL INVESTMENT ($)	DISCOUNTED SAVINGS ($)	SIMPLE PAYBACK (yrs)	SIR
1022	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
1023	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	$374	$57	$0	$430	$38,019	$7,417	88.36	0.20
625	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
631	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
650	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
658	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
732	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
740	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
750	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
753	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
822	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
825	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
838	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
842	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
1008	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
1009	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
1022	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
1023	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	$358	$53	$0	$411	$37,132	$7,091	90.30	0.19
638	Administration Bldg	3,700	ECO 2	34.81	5.56	40.37	0.00	$184	$41	$0	$225	$21,836	$3,839	96.95	0.18
743	Administration Bldg	3,700	ECO 2	34.81	5.56	40.37	0.00	$184	$41	$0	$225	$21,836	$3,839	96.95	0.18
832	Administration Bldg	3,700	ECO 2	34.81	5.56	40.37	0.00	$184	$41	$0	$225	$21,836	$3,839	96.95	0.18
638	Administration Bldg	3,700	ECO 1	33.13	5.26	38.39	0.00	$176	$38	$0	$214	$21,565	$3,649	100.74	0.17
743	Administration Bldg	3,700	ECO 1	33.13	5.26	38.39	0.00	$176	$38	$0	$214	$21,565	$3,649	100.74	0.17
832	Administration Bldg	3,700	ECO 1	33.13	5.26	38.39	0.00	$176	$38	$0	$214	$21,565	$3,649	100.74	0.17
730	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
731	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
736	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
737	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
738	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
747	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
748	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
755	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
756	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
757	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
815	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
816	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
817	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
818	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
819	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
827	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14

TABLE 6-1
ECONOMIC SUMMARY OF ECOs - RANKED BY SIR

BLDG NO.	BLDG NAME	BUILDING AREA (SF)	ECO NO.	NAT. GAS ENERGY SAVINGS (MBtu/yr)	ELEC. ENERGY SAVINGS (MBtu/yr)	TOTAL ENERGY SAVINGS (MBtu/yr)	ELEC. DEMAND SAVINGS (kW)	NAT. GAS COST SAVINGS ($/yr)	ELEC. COST SAVINGS ($/yr)	ELEC. DEMAND COST SAVINGS ($/yr)	TOTAL ENERGY COST SAVINGS ($/yr)	TOTAL INVESTMENT ($)	DISCOUNTED SAVINGS ($)	SIMPLE PAYBACK (yrs)	SIR
828	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
829	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
830	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
831	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	$1,478	$0	$0	$1,478	$183,884	$26,252	124.40	0.14
730	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
731	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
736	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
737	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
738	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
747	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
748	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
755	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
756	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
757	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
815	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
816	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
817	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
818	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
819	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
827	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
828	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
829	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
830	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
831	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	$1,387	$0	$0	$1,387	$178,577	$24,636	128.73	0.14
640	Gymnasium	20,425	ECO 1	160.33	0.00	160.33	0.00	$850	$0	$0	$850	$129,351	$15,092	152.22	0.12
746	Gymnasium	20,425	ECO 1	160.33	0.00	160.33	0.00	$850	$0	$0	$850	$129,351	$15,092	152.22	0.12
826	Gymnasium	20,425	ECO 1	160.33	0.00	160.33	0.00	$850	$0	$0	$850	$129,351	$15,092	152.22	0.12
640	Gymnasium	20,425	ECO 2	166.97	0.00	166.97	0.00	$885	$0	$0	$885	$139,097	$15,717	157.18	0.11
746	Gymnasium	20,425	ECO 2	166.97	0.00	166.97	0.00	$885	$0	$0	$885	$139,097	$15,717	157.18	0.11
826	Gymnasium	20,425	ECO 2	166.97	0.00	166.97	0.00	$885	$0	$0	$885	$139,097	$15,717	157.18	0.11
844	Brigade HQ	9,890	ECO 1	45.94	12.32	58.25	0.86	$243	$90	$64	$397	$61,881	$6,425	155.79	0.10
1018	Brigade HQ	9,890	ECO 1	45.94	12.32	58.25	0.86	$243	$90	$64	$397	$61,881	$6,425	155.79	0.10
636	Brigade HQ	9,236	ECO 1	42.90	11.50	54.40	0.80	$227	$84	$59	$371	$57,789	$6,000	155.79	0.10
741	Brigade HQ	9,236	ECO 1	42.90	11.50	54.40	0.80	$227	$84	$59	$371	$57,789	$6,000	155.79	0.10
844	Brigade HQ	9,890	ECO 2	48.27	12.83	61.10	0.86	$256	$94	$64	$413	$65,384	$6,696	158.19	0.10
1018	Brigade HQ	9,890	ECO 2	48.27	12.83	61.10	0.86	$256	$94	$64	$413	$65,384	$6,696	158.19	0.10
636	Brigade HQ	9,236	ECO 2	45.08	11.98	57.06	0.80	$239	$88	$59	$386	$61,061	$6,253	158.19	0.10
741	Brigade HQ	9,236	ECO 2	45.08	11.98	57.06	0.80	$239	$88	$59	$386	$61,061	$6,253	158.19	0.10

APPENDIX A

SCOPE OF WORK, CONFIRMATION NOTICES, CORRESPONDENCE

MRK-EP-DI

REVISED
10 APR 1995

GENERAL SCOPE OF WORK

FOR A

LIMITED ENERGY STUDY

INSULATING BRICK BUILDINGS

FORT LEONARD WOOD, MISSOURI

Performed as part of the

ENERGY ENGINEERING ANALYSIS PROGRAM (EEAP)

SCOPE OF WORK
FOR A
LIMITED ENERGY STUDY

TABLE OF CONTENTS

1. BRIEF DESCRIPTION OF WORK

2. GENERAL

3. PROJECT MANAGEMENT

4. SERVICES AND MATERIALS

5. PROJECT DOCUMENTATION

   5.1 ECIP Projects
   5.2 Non-ECIP Projects
   5.3 Nonfeasible ECOs

6. DETAILED SCOPE OF WORK

7. WORK TO BE ACCOMPLISHED

   7.1 Perform a Limited Site Survey
   7.2 Evaluate Selected ECOs
   7.3 Combine ECOs into Recommended Projects
   7.4 Submittals, Presentations and Reviews

ANNEXES

A - DETAILED SCOPE OF WORK

B - EXECUTIVE SUMMARY GUIDELINE

C - REQUIRED DD FORM 1391 DATA

1. BRIEF DESCRIPTION OF WORK: The Architect-Engineer (AE) shall:

1.1 Perform a limited site survey of specific buildings or areas to collect all data required to evaluate the specific ECOs included in this study.

1.2 Evaluate specific ECOs to determine their energy savings potential and economic feasibility.

1.3 Provide project documentation for recommended ECOs as detailed herein.

1.4 Prepare a comprehensive report to document all work performed, the results and all recommendations.

2. GENERAL

2.1 This study is limited to the evaluation of the specific buildings, systems, or ECOs listed in Annex A, DETAILED SCOPE OF WORK.

2.2 The information and analysis outlined herein are considered to be minimum requirements for adequate performance of this study.

2.3 For the buildings, systems or ECOs listed in Annex A, all methods of energy conservation which are reasonable and practical shall be considered, including improvements of operational methods and procedures as well as the physical facilities. All energy conservation opportunities which produce energy or dollar savings shall be documented in this report. Any energy conservation opportunity considered infeasible shall also be documented in the report with reasons for elimination.

2.4 The study shall consider the use of all energy sources applicable to each building, system, or ECO.

2.5 The "Energy Conservation Investment Program (ECIP) Guidance", described in letter from DAIM-FDF-U, dated 10 January 1994 establishes criteria for ECIP projects and shall be used for performing the economic analyses of all ECOs and projects. The program, Life Cycle Cost In Design (LCCID), has been developed for performing life cycle cost calculations in accordance with ECIP guidelines and is referenced in the ECIP Guidance. If any program other than LCCID is proposed for life cycle cost analysis, it must use the mode of calculation specified in the ECIP Guidance. The output must be in the format of the ECIP LCCA summary sheet, and it must be submitted for approval to the Contracting Officer.

2.6 Computer modeling will be used to determine the energy savings of ECOs which would significantly change the heatingand cooling loads of an existing HVAC system. The requirement to use computer modeling applies only to heated and air-conditioned or air-conditioned-only buildings which exceed 8,000 square feet or heated-only buildings in excess of 20,000 square feet. Modeling will be done using a professionally recognized and proven computer program or programs that integrate architectural features with air-conditioning, heating, lighting and other energy-producing or consuming systems. These programs will be capable of simulating the features, systems, and thermal loads of the building under study. The program will use established weather data files and may perform calculations on a true hour-by-hour basis or may condense the weather files and the number of calculations into several "typical" days per month. The Detailed Scope of Work, Annex A, will list programs that are acceptable to the Contracting Officer. If the AE desires to use a different program, it must be submitted for approval with a sample run, an explanation of all input and output data, and a summary of program methodology and energy evaluation capabilities.

2.7 Energy conservation opportunities determined to be technically and economically feasible shall be developed into projects acceptable to installation personnel. This may involve combining similar ECOs into larger packages which will qualify for ECIP or FEMP funding, and determining in coordination with installation personnel the appropriate packaging and implementation approach for all feasible ECOs.

2.7.1 Projects which qualify for ECIP funding shall be identified, separately listed, and prioritized by the Savings to Investment Ratio (SIR).

2.7.2 All feasible non-ECIP projects shall be ranked in order of highest to lowest SIR.

3. PROJECT MANAGEMENT

3.1 Project Managers. The AE shall designate a project manager to serve as a point of contact and liaison for work required under this contract. Upon award of this contract, the individual shall be immediately designated in writing. The AE's designated project manager shall be approved by the Contracting Officer prior to commencement of work. This designated individual shall be responsible for coordination of work required under this contract. The Contracting Officer will designate a project manager to serve as the Government's point of contact and liaison for all work required under this contract. This individual will be the Government's representative.

3.2 Installation Assistance. The Commanding Officer or authorized representative at the installation will designate an individual to assist the AE in obtaining information and establishing contacts necessary to accomplish the work required under this contract. This individual will be the installation representative.

3.3 Public Disclosures. The AE shall make no public announcements or disclosures relative to information contained or developed in this contract, except as authorized by the Contracting Officer.

3.4 Meetings. Meetings will be scheduled whenever requested by the AE or the Contracting Officer for the resolution of questions or problems encountered in the performance of the work. The AE's project manager and the Government's representative shall be required to attend and participate in all meetings pertinent to the work required under this contract as directed by the Contracting Officer. These meetings, if necessary, are in addition to the presentation and review conferences.

3.5 Site Visits, Inspections, and Investigations. The AE shall visit and inspect/investigate the site of the project as necessary and required during the preparation and accomplishment of the work.

3.6 Records

3.6.1 The AE shall provide a record of all significant conferences, meetings, discussions, verbal directions, telephone conversations, etc., with Government representative(s) relative to this contract in which the AE and/or designated representative(s) thereof participated. These records shall be dated and shall identify the contract number, and modification number if applicable, participating personnel, subject discussed and conclusions reached. The AE shall forward to the Contracting Officer within ten calendar days, a reproducible copy of the records.

3.6.2 The AE shall provide a record of requests for and/or receipt of Government-furnished material, data, documents, information, etc., which if not furnished in a timely manner, would significantly impair the normal progression of the work under this contract. The records shall be dated and shall identify the contract number and modification number, if applicable. The AE shall forward to the Contracting Officer within ten calendar days, a reproducible copy of the record of request or receipt of material.

3.7 Interviews. The AE and the Government's representative shall conduct entry and exit interviews with the Director of

Public Works before starting work at the installation and after completion of the field work. The Government's representative shall schedule the interviews at least one week in advance.

3.7.1 Entry. The entry interview shall describe the intended procedures for the survey and shall be conducted prior to commencing work at the facility. As a minimum, the interview shall cover the following points:

a. Schedules.

b. Names of energy analysts who will be conducting the site survey.

c. Proposed working hours.

d. Support requirements from the Director of Public Works.

3.7.2 Exit. The exit interview shall briefly describe the items surveyed and probable areas of energy conservation. The interview shall also solicit input and advice from the Director of Public Works.

4. SERVICES AND MATERIALS. All services, materials (except those specifically enumerated to be furnished by the Government), plant, labor, supervision and travel necessary to perform the work and render the data required under this contract are included in the lump sum price of the contract.

5. PROJECT DOCUMENTATION. All energy conservation opportunities which the AE has considered shall be included in one of the following categories and presented in the report as such:

5.1 ECIP Projects. To qualify as an ECIP project, an ECO, or several ECOs which have been combined, must have a construction cost estimate greater than $300,000, a Savings to Investment Ratio greater than 1.25 and a simple payback period of less than ten years. The overall project and each discrete part of the project shall have an SIR greater than 1.25. All projects meeting the above criteria shall be arranged as specified in paragraph 2.7.1 and shall be provided with programming documentation. Programming documentation shall consist of a DD Form 1391, life cycle cost analysis (LCCA) summary sheet(s) (with necessary backup data to verify the numbers presented). A life cycle cost analysis summary sheet shall be developed for each ECO and for the overall project when more than one ECO are combined. The energy savings for projects consisting of multiple ECOs must take into account the synergistic effects of the individual ECOs.

5.2 Non-ECIP Projects. Projects which do not meet ECIP criteria with regard to cost estimate, payback period, but which have an SIR greater than 1.25 shall be documented. Projects or ECOs in this category shall be arranged as specified in paragraph 2.7.2 and shall be provided with the following documentation: the life cycle cost analysis (LCCA) summary sheet completely filled out, a description of the work to be accomplished, backup data for the LCCA, ie, energy savings calculations and cost estimate(s), and the simple payback period. The energy savings for projects consisting of multiple ECOs must take into account the synergistic effects of the individual ECOs. In addition these projects shall have the necessary documentation prepared, as required by the Government's representative, for one of the following categories:

a. Federal Energy Management Program (FEMP) Projects. A FEMP (or O&M Energy project is one that results in needed maintenance or repair to an existing facility, or replaces a failed or failing existing facility, and also results in energy savings. The criteria are similar to the criteria for ECIP projects, ie, SIR $\geq$ 1.25, and simple payback period of less than ten years. Projects with a construction cost estimate up to ~~$1,000,000~~ $300,000 shall be documented as outlined in par 5.2 above; projects over ~~$1,000,000~~ $300,000 shall be documented on 1391s. in the FEMP program, a system may be defined as "failed of failing" if it is efficient or technically obsolete. However, if this strategy is used to justify a proposed project, the equipment to be replaced must have been in use for at least three years.

b. Low Cost/No Cost Projects. These are projects which the Director of Public Works (DPW) can perform using his resources. Documentation shall be as required by the DPW.

5.3 Nonfeasible ECOs. All ECOs which the AE has considered but which are not feasible, shall be documented in the report with reasons and justifications showing why they were rejected.

6. DETAILED SCOPE OF WORK. The Detailed Scope of Work is contained in Annex A.

7. WORK TO BE ACCOMPLISHED.

7.1 Perform a Limited Site Survey. The AE shall obtain all necessary data to evaluate the ECOs or projects by conducting a site survey. However, the AE is encouraged to use any data that may have been documented in a previous study. The AE shall document his site survey on forms developed for the survey, or standard forms, and submit these completed forms as part of the report. All test and/or measurement equipment shall be properly calibrated prior to its use.

7.2 Evaluate Selected ECOs. The AE shall analyze the ECOs listed in Annex A. These ECOs shall be analyzed in detail to determine their feasibility. Savings to Investment Ratios (SIRs) shall be determined using current ECIP guidance. The AE shall provide all data and calculations needed to support the recommended ECO. All assumptions and engineering equations shall be clearly stated. Calculations shall be prepared showing how all numbers in the ECO were figured. Calculations shall be an orderly step-by-step progression from the first assumption to the final number. Descriptions of the products, manufacturers catalog cuts, pertinent drawings and sketches shall also be included. A life cycle cost analysis summary sheet shall be prepared for each ECO and included as part of the supporting data.

7.3 Combine ECOs Into Recommended Projects. During the Interim Review Conference, as outlined in paragraph 7.4.1], the AE will be advised of the DEH's preferred packaging of recommended ECOs into projects for implementation. Some projects may be a combination of several ECOs, and others may contain only one. These projects will be evaluated and arranged as outlined in paragraphs 5.1, 5.2, and 5.3. Energy savings calculations shall take into account the synergistic effects of multiple ECOs within a project and the effects of one project upon another. The results of this effort will be reported in the Final Submittal per par 7.4.2.

7.4 Submittals, Presentations and Reviews. The work accomplished shall be fully documented by a comprehensive report. The report shall have a table of contents and shall be indexed. Tabs and dividers shall clearly and distinctly divide sections, subsections, and appendices. All pages shall be numbered. Names of the persons primarily responsible for the project shall be included. The AE shall give a formal presentation of the interim submittal to installation, command, and other Government personnel. Slides or view graphs showing the results of the study to date shall be used during the presentation. During the presentation, the personnel in attendance shall be given ample opportunity to ask questions and discuss any changes deemed necessary to the study. A review conference will be conducted the same day, following the presentation. Each comment presented at the review conference will be discussed and resolved or action items assigned. It is anticipated that the presentation and review conference will require approximately one working day. The presentation and review conference will be at the installation on the date agreeable to the Director of Engineering and Housing, the AE and the Government's representative. The Contracting Officer may require a re-submittal of any document(s), if such document(s) are not approved because they are determined by the Contracting Officer to be inadequate for the intended purpose.

7.4.1 Interim Submittal. An interim report shall be submitted for review after the field survey has been completed and an analysis has been performed on all of the ECOs. The report shall indicate the work which has been accomplished to date, illustrate the methods and justifications of the approaches taken and contain a plan of the work remaining to complete the study. Calculations showing energy and dollar savings, SIR, and simple payback period of all the ECOs shall be included. The results of the ECO analyses shall be summarized by lists as follows:

a.All ECOs eliminated from consideration shall be grouped into one listing with reasons for their elimination as discussed in par 5.3.

b.All ECOs which were analysed shall be grouped into two listings, recommended and non-recommended, each arranged in order of descending SIR. These lists may be subdivided by building or area as appropriate for the study. The AE shall submit the Scope of Work and any modifications to the Scope of Work as an appendix to the report. A narrative summary describing the work and results to date shall be a part of this submittal. At the Interim Submittal and Review Conference, the Government's and AE's representatives shall coordinate with the Director of Public Works to provide the AE with direction for packaging or combining ECOs for programming purposes and also indicate the fiscal year for which the programming or implementation documentation shall be prepared. The survey forms completed during this audit shall be submitted with this report. The survey forms only may be submitted in final form with this submittal. They should be clearly marked at the time of submission that they are to be retained. They shall be bound in a standard three-ring binder which will allow repeated disassembly and reassembly of the material contained within.

7.4.2 Final Submittal. The AE shall prepare and submit the final report when all sections of the report are 100% complete and all comments from the interim submittal have been resolved. The AE shall submit the Scope of Work for the study and any modifications to the Scope of Work, and a copy of the reponses to previous comments as an appendix to the submittal. The report shall contain a narrative summary of conclusions and recommendations, together with all raw and supporting data, methods used, and sources of information. The report shall integrate all aspects of the study. The recommended projects, as determined in accordance with paragraph 5, shall be presented in order of priority by SIR. The lists of ECOs specified in paragraph 7.4.1 shall also be included for continuity. The final report and all appendices shall be bound in standard three-ring binders which will allow repeated disassembly and reassembly. The final report shall be arranged to include:

a. An Executive Summary to give a brief overview of what was accomplished and the results of this study using graphs, tables and charts as much as possible (See Annex B for minimum requirements).

b. The narrative report describing the problem to be studied, the approach to be used, and the results of this study.

c. Documentation for the recommended projects (includes LCCA Summary Sheets).

d. Appendices to include as a minimum:

1) Energy cost development and backup data

2) Detailed calculations

3) Cost estimates

4) Computer printouts (where applicable)

5) Scope of Work

ANNEX A

DETAILED SCOPE OF WORK

1. LOCATION

a. GENERAL DESCRIPTION. The Architect Engineer (AE) shall furnish all services, materials, supplies, labor, equipment, investigations, studies, and travel as required in connection with the feasibility study for the below identified project in accordance with the contract and all furnished instructions:

INSTALLATION	DESCRIPTION
Fort Leonard Wood, Missouri	Insulating Brick Buildings

b. The project consists of studying the feasibility of providing insulation for 100 existing brick buildings in the 600, 700, 800 & 1000 areas. The total floor area is over 2,000,000 square feet. There are approximately 15 typical buildings. The buildings were built in the early 1960s with little regard for energy conservation. The existing wall construction yields an "R" value of 4, which is 80% below current DOE reommendations for this area. This study would investigate the feasibility of installing insulation within these buildings.

2. AUTHORIZATION. The feasibility study for this project is authorized by Memorandum CEMP-ET, Subject: Energy Engineering Analysis Program (EEAP)-FY95S dated 30 December 1994. The AE shall make reference to this authority in the study.

3. STUDY INSTRUCTIONS. If the Design Manuals, Guide Specifications, and/or Project Engineering Instructions do not cover a specific condition in question, the AE shall contact the Contracting Officer before proceeding. If there is a conflict in Engineering Instructions or other reference data, such questions or conflicts should be brought to the attention of the Contracting Officer before proceeding.

4. THE INSTALLATION REPRESENTATIVE for this contract will be Mr. Douglas Cage, Directorate of Public Works, telephone number 314-596-0864, fax number 314-596-0882. The Kansas City Project Manager will be Mr. David Werner, telephone number 816-426-2597, fax number 816-426-3690. The Authorized Representative of the Contracting Officer will be Mr. Michael Whitacre, telephone number 816-426-2781, fax number 816-426-3690..

5. COMPLETION AND PAYMENT SCHEDULE: The following schedule shall be used as a guide in approving payments on this contract. The interim report shall be due not later than 180 days after Notice to Proceed. The final report shall be due not later than

60 days after the interim report review conference.

MILESTONE	PERCENT OF CONTRACT AMOUNT AUTHORIZED FOR PAYMENT
Entry Interview	10
Completion of Field Work	25
Receipt of Interim Submittal	75
Completion of Interim Presentation & Review	85

6. METHOD OF PAYMENT.

a. Title I. The AE shall prepare and submit to the US Army Engineer District, Kansas City, partial payment estimates in accordance with the attachment entitled "Instructions for Completion of ENG Form 93." All partial payments shall be based on work completed as of the 15th day of the report month and shall be submitted to the office of the Contracting Officer by the 18th day of the month. Payment under this contract, for which property or services are provided in a series of partial executions or deliveries, will be made within 30 days after receipt of an invoice which has been properly executed by the AE.

b. Additional Conferences. Payment for furnishing the services of technically qualified representatives to attend additional conferences, when so requested in writing by the Contracting Officer, will be made at a rate per hour for the discipline involved plus travel expenses computed in accordance with Government Joint Travel Regulations in effect at the time travel is performed and actual cost of transportation.

7. THE SIMULATION PROGRAMS acceptable for use in this study are listed below. Any substitutes must be submitted and approved as outlined in the basic scope of work.

a. Building Loads and System Thermodynamics (BLAST)

b. DOE 2.1B (EZDOE)

c. Carrier E20 or Hourly Analysis Program (HAP)

d. Trane Air-Conditioning Economics (TRACE)

e. Beacon

8. A COMPUTER PROGRAM titled Life Cycle Costing in Design (LCCID) is available from the BLAST Support Office in Urbana, Illinois for a nominal fee. This computer program can be used for performing the economic calculations for ECIP and non-ECIP ECOs. The AE is encouraged to obtain and use this computer program. The BLAST Support Office can be contacted at 144 Mechanical Engineering Building, 1206 West Green Street, Urbana, Illinois 61801. Telephone number is (217) 333-3977 or (800) 842-5278.

9. FACILITY SURVEY

The Architect-Engineer (AE) shall conduct a survey of the buildings to be insulated.

10. AUTOMATED REVIEW MANAGEMENT SYSTEM (ARMS).

a. The AE, as a part of this scope of work, shall interface with and utilize the Corps of Engineers Automated Review Management System for this project. The AE will receive one copy of CESPK-PAM 1110-1-2, AE Response Package (User's Manual) describing the communications software, optimum hardware requirements and access procedures. The necessary software is included with the manual. Minimum requirements are an IBM-XT or compatible computer system running DOS 3.0 or later, with 640 kilobyte (KB) RAM, at least a 20 megabyte (MB) hard disk and a 1200 or higher baud Hayes-compatible modem operating. Assistance can be received via a telephone hotline at 916-551-3126.

b. All design review comments and responses will be electronically transmitted from the Corps of Engineer, Missouri River Division, by the ARMS. Comments can be received at a personal computer in the AE's office by use of ARMS software and a modem over telephone lines. The comments reside on the Missouri River Division computer. The AE can then download the review comments, respond to the comments, upload the comments back to the Division computer and forward responses to the Project Manager.

11. GOVERNMENT-FURNISHED DATA.

a. AR 415-15 Military Construction, Army (MCA) Program Development

b. AR 415-20 Project Development and Design Approval

d. Engineering Instructions (as applicable)

e. Latest Tri-Service Cost Index.

f. DAIM-FDF-U letter dated 10 January 1994, "Energy Conservation Investment Program (ECIP) Guidance".

g. TM 5-785 Engineering Weather Data

h. As-built drawings of the buildings

12. SUBMITTAL REQUIREMENTS.

ORGANIZATION	COPIES REQUIRED (Correspondence); Interim Review		(Final)
Commander Directorate of Public Works Environment, Energy, & Natural Rescource Div. ATTN: ATZT-DPW-EE/Mr. Cage Building 2101 Fort Leonard Wood, Missouri 65473-5000	(1)	3***	(3)
District Engineer U.S. Army Engineer District, Kansas City ATTN: CEMRK-EP-DI (WERNER) 700 Federal Building, 601 E. 12th St. Kansas City, Missouri 64106-2896	(1)	3***	(3)
Division Engineer U.S.Army Engineer Division Missouri River ATTN: CEMRD-MP-M (Jagasits) 12565 W. Center Road Omaha, NE 68144-3869	(1)	1 ~~3***~~	(1)
Commander USA TRADOC ATTN: ATBO-GF/ Mr. Hill Building 10 Fort Monroe, Va. 23351-5000	(1)	1	(1)
Commander U.S. Army Corps of Engineers ATTN: CEMP-ET (Mr. Gentil) 20 Massachusetts Avenue, NW Washington, DC 20314-1000			(1)*
Commander U.S. Army Engineer District, Mobile ATTN: CESAM-EN-DM (Mr. Battaglia) P.O. Box 2288 Mobile, AL 36628-1000	(1)	1	(1)

ORGANIZATION	COPIES REQUIRED correspondence	interim	final
Commander U.S Army Logistics Evaluation Agency ATTN: LOEA-PL (Mr. Keath) New Cumberland Army Depot New Cunberland, PA. 17070-5007			(1)*

* Executive Summary only

*** Furnish copy of computer print out

LIST OF BUILDINGS TO BE STUDIED

BUILDING NO.	SQUARE FEET	CURRENT USE	
639	5413	BRANCH PX	
744	6240	BRANCH PX	
835	6240	BRANCH PX	
1026	8533	BRANCH PX	4
638	9236	BRIGADE HQ	
741	9236	BRIGADE HQ	
844	9890	BRIGADE HQ	
1018	9890	BRIGADE HQ	4
637	8949	CHAPEL	
742	8949	CHAPEL	
843	8890	CHAPEL	3
630	13280	DINING FACILITY	
632	13280	DINING FACILITY	
653	13280	DINING FACILITY	
657	13280	DINING FACILITY	
735	13280	DINING FACILITY	
739	13280	DINING FACILITY	
749	13280	DINING FACILITY	
754	13280	DINING FACILITY	
820	13280	DINING FACILITY	
821	13280	DINING FACILITY	
836	13280	DINING FACILITY	
837	13280	DINING FACILITY	
1010	13280	DINING FACILITY	
1011	13280	DINING FACILITY	
1027	13280	DINING FACILITY	15
638	3700	DISPENSARY	
743	3700	DISPENSARY	
832	3700	DISPENSARY	3
640	20425	GYM	
746	20425	GYM	
826	20425	GYM	3
626	12155	SUPPLY/ADMIN	
633	12155	SUPPLY/ADMIN	
655	12155	SUPPLY/ADMIN	
656	12155	SUPPLY/ADMIN	
733	12155	SUPPLY/ADMIN	
734	12155	SUPPLY/ADMIN	
751	12155	SUPPLY/ADMIN	
752	12155	SUPPLY/ADMIN	
823	12155	SUPPLY/ADMIN	
824	12155	SUPPLY/ADMIN	
840	12155	SUPPLY/ADMIN	
841	12155	SUPPLY/ADMIN	
1006	12155	SUPPLY/ADMIN	
1007	12155	SUPPLY/ADMIN	
1025	12155	SUPPLY/ADMIN	15

BUILDING NO.	SQUARE FEET	CURRENT USE	
627	40640	BARRACKS	
628	40640	BARRACKS	
629	40640	BARRACKS	
634	40990	BARRACKS	
635	40990	BARRACKS	
651	40990	BARRACKS	
652	40990	BARRACKS	
654	40990	BARRACKS	
659	40990	BARRACKS	
660	40990	BARRACKS	
730	40640	BARRACKS	
731	40640	BARRACKS	
736	40640	BARRACKS	
737	40640	BARRACKS	
738	40640	BARRACKS	
747	40640	BARRACKS	
748	40640	BARRACKS	
755	40640	BARRACKS	
756	40640	BARRACKS	
757	40640	BARRACKS	
815	40640	BARRACKS	
816	40640	BARRACKS	
817	40640	BARRACKS	
818	40640	BARRACKS	
819	40640	BARRACKS	
827	40640	BARRACKS	
828	40640	BARRACKS	
829	40640	BARRACKS	
830	40640	BARRACKS	
831	40640	BARRACKS	
1012	40640	BARRACKS	
1013	40640	BARRACKS	
1014	40640	BARRACKS	
1015	40640	BARRACKS	
1016	40640	BARRACKS	
1028	40640	BARRACKS	
1029	40640	BARRACKS	37
626	6163	BN HQ/ADMIN	
631	6163	BN HQ/ADMIN	
650	6163	BN HQ/ADMIN	
658	6163	BN HQ/ADMIN	
732	6163	BN HQ/ADMIN	
740	6163	BN HQ/ADMIN	
750	6163	BN HQ/ADMIN	
753	6163	BN HQ/ADMIN	
822	6163	BN HQ/ADMIN	
825	6163	BN HQ/ADMIN	
838	6163	BN HQ/ADMIN	
842	6163	BN HQ/ADMIN	
1008	6163	BN HQ/ADMIN	

BUILDING NO.	SQUARE FEET	CURRENT USE	
1009	6163	BN HQ/ADMIN	
1022	6163	BN HQ/ADMIN	
1023	6163	BN HQ/ADMIN	16
TOTAL NUMBER OF BUILDINGS			100

*MODELING AND CALCULATION OF TYPICAL BUILDINGS MAY BE EXTENDED TO COVER BUILDINGS OF SIMILAR CONSTRUCTION.

~~TO BE ADDED~~

~~* TYPICAL BUILDING~~

ANNEX B

EXECUTIVE SUMMARY GUIDELINE

1. Introduction.

2. Building Data (types, number of similar buildings, sizes, etc.)

3. Present Energy Consumption of Buildings or Systems Studied.

   - o Total Annual Energy Used.
   - o Source Energy Consumption.

     Electricity - KWH, Dollars, BTU
     Fuel Oil - GALS, Dollars, BTU
     Natural Gas - THERMS, Dollars, BTU
     Propane - GALS, Dollars, BTU
     Other - QTY, Dollars, BTU

4. Reevaluated Projects Results.

5. Energy Conservation Analysis.

   - o ECOs Investigated.
   - o ECOs Recommended.
   - o ECOs Rejected. (Provide economics or reasons)
   - o ECIP Projects Developed. (Provide list)*
   - o Non-ECIP Projects Developed. (Provide list)*
   - o Operational or Policy Change Recommendations.

   * Include the following data from the life cycle cost analysis summary sheet: the cost (construction plus SIOH), the annual energy savings (type and amount), the annual dollar savings, the SIR, the simple payback period and the analysis date.

6. Energy and Cost Savings.

   - o Total Potential Energy and Cost Savings.
   - o Percentage of Energy Conserved.

- Energy Use and Cost Before and After the Energy Conservation Opportunities are Implemented.

ANNEX C

REQUIRED DD FORM 1391 DATA

To facilitate ECIP project approval, the following supplemental data shall be provided:

a. In title block clearly identify projects as "ECIP."

b. Complete description of each item of work to be accomplished including quantity, square footage, etc.

c. A comprehensive list of buildings, zones, or areas including building numbers, square foot floor area, designated temporary or permanent, and usage (administration, patient treatment, etc.).

d. List references, and assumptions, and provide calculations to support dollar and energy savings, and indicate any added costs.

(1) If a specific building, zone, or area is used for sample calculations, identify building, zone or area, category, orientation, square footage, floor area, window and wall area for each exposure.

(2) Identify weather data source.

(3) Identify infiltration assumptions before and after improvements.

(4) Include source of expertise and demonstrate savings claimed. Identify any special or critical environmental conditions such as pressure relationships, exhaust or outside air quantities, temperatures, humidity, etc.

e. Claims for boiler efficiency improvements must identify data to support present properly adjusted boiler operation and future expected efficiency. If full replacement of boilers is indicated, explain rejection of alternatives such as replace burners, nonfunctioning controls, etc. Assessment of the complete existing installation is required to make accurate determinations of required retrofit actions.

f. Lighting retrofit projects must identify number and type of fixtures, and wattage of each fixture being deleted and installed. New lighting shall be only of the level to meet current criteria. Lamp changes in existing fixtures is not considered an ECIP type project.

g. An ECIP life cycle cost analysis summary sheet as shown in the ECIP Guidance shall be provided for the complete project and for each discrete part included in the project. The SIR is applicable to all segments of the project. Supporting documentation consisting of basic engineering and economic calculations showing how savings were determined shall be included.

h. The DD Form 1391 face sheet shall include, for the complete project, the annual dollar and MBTU savings, SIR, simple amortization period and a statement attesting that all buildings and retrofit actions will be in active use throughout the amortization period.

i. The calendar year in which the cost was calculated shall be clearly shown on the DD Form 1391.

j. For each temporary building included in a project, separate documentation is required showing (1) a minimum 10-year continuing need, based on the installation's annual real property utilization survey, for active building retention after retrofit, (2) the specific retrofit action applicable and (3) an economic analysis supporting the specific retrofit.

k. Nonappropriated funded facilities will not be included in an ECIP project without an accompanying statement certifying that utility costs are not reimbursable.

l. Any requirements required by ECIP guidance dated 10 January 1994 and any revisions thereto. Note that unescalated costs/savings are to be used in the economic analyses.

m. The five digit category number for all ECIP projects except for Family Housing is 80000. The category code number for Family Housing projects is 71100.

EMC
ENGINEERS, INC.

2750 South Wadsworth Blvd. • Suite C-200
Denver, Colorado 80227-3400
(303) 988-2951 • Fax: (303) 985-2527

2 August 1995

EMC # P13F-030

Department of the Army
Kansas City District, Corps of Engineers
Attn: CEMRK-CT-M/Butler
700 Federal Building
Kansas City, Missouri 64103-2896

Re: DACA01-94-D-0033
Limited Energy Study, Insulating Brick Buildings
Fort Leonard Wood, Missouri

Dear Ms. Butler:

Enclosed is our revised fee proposal for the above referenced project.
The fee is based on work defined by the Scope of Work dated 10 April 1995.

We propose a fee of $90,771 for the work on this project.

There is one item in the Scope of Work which was clarified during fee negotiation:

- Paragraph 3.4 indicates that "Meetings will be scheduled when ever requested by the AE or the Contracting Officer". We have budgeted for only two trips to Fort Leonard Wood. Additional trips for additional meetings will require additional compensation.

Attached is a quote for a round trip coach ticket from Denver to St. Louis. A regular coach class ticket purchased 8-2-95 for 9-10-95 flight from either Denver or Colorado Springs is $928.00.

We look forward to working with you on this project. Please give me a call if you have any questions.

Sincerely,

E M C ENGINEERS, INC.

Dennis Jones

Dj:mj w:\dennis\leonwood\fee-let.doc

EMC ENGINEERS, INC.

2750 South Wadsworth Blvd. • Suite C-200
Denver, Colorado 80227-3400
303/988-2951 • Fax: 303/985-2527

CONFIRMATION NOTICE

Confirmation Notice No. 1 EMC #1406.011

DATE: 27 November 1995

PROJECT: Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, Missouri

CONTRACT NO.: DACA 01-94-D-0033, Del. Ord. 0009

NOTES PREPARED BY: Alan Niemeyer, E M C Engineers, Inc.

DATE OF MEETING: 6 November 1995

PLACE OF MEETING: Building 2101, Ft. Leonard Wood, Missouri

SUBJECT: Entrance Interview Meeting

ATTENDEES:

Douglas Cage	Directorate of Public Works (DPW) Energy, Fort Leonard Wood	(314) 596-0869
Alan Niemeyer	EMC Engineers, Inc.	(303) 988-2951
David Sinz	EMC Engineers, Inc.	(303) 988-2951

Introductions were made at the start of the meeting.

The Scope of Work (SOW) was reviewed. The following items were clarified:

- EMC will evaluate insulation installed on interior surfaces, and will not evaluate insulation installed on the exterior brick wall or roof surfaces.
- EMC will include roof insulation as part of the energy study.
- The SOW states there are 15 representative buildings in the list of 100 buildings. Mr. Niemeyer stated that after reviewing the list of 100 buildings, the study would require between 10 and 12 representative buildings for the purpose of computer building energy simulations. Mr. Cage stated that 10 to 12 representative buildings would be satisfactory, and that the 15 representative buildings in the SOW was an estimate.

The field survey procedures were discussed. Mr. Niemeyer stated that EMC would survey the representative buildings in detail, and then would walk through the remaining buildings to record any differences. The field survey data will be recorded on field survey forms (see attached forms). EMC will observe the baseboard radiation and fan coil units during the field survey to determine if they can be moved easily for the insulation upgrade.

The approach to the study was briefly discussed. Mr. Niemeyer asked if DPW would provide the optimum R-values for insulation on walls and roofs at Ft. Leonard Wood. Mr. Cage said that an evaluation to determine the optimum R-values should be included in the study. Mr. Niemeyer said EMC will perform life cycle costing to determine the optimum R-values.

Mr. Cage stated the project SIR and Simple Payback are important factors to consider for project funding. Mr. Niemeyer stated that EMC will consider ways to optimize these factors.

Alan J. Niemeyer
Project Engineer, E M C Engineers, Inc.

Attachments: Field Survey Forms

ILDING MANAGER INTERVIEW

BUILDING INFORMATION:			
Building No:	Building Name:		
Surveyed by:	Date:	Building Use:	
Building Contact:		Phone No:	
Building Contact:		Phone No:	
OCCUPANCY:			
Number of Employees:	Mon./Fri.:	Schedule:	To
	Tues./Thurs.		To
	Wed.		To
	Sat./Sun.		To
Visitors Per Day:	Mon./Fri.:	Schedule:	To
	Tues./Thurs.		To
	Wed.		To
	Sat./Sun.		To
Comments:			
LIGHTING SCHEDULE:			
Normal Occupancy:	Mon.-Fri.:	Schedule:	To
	Sat./Sun.:		To
Cleaning Crew/2nd Shift:	Mon.-Fri.:	Schedule:	To
	Sat./Sun.:		To
EQUIPMENT SCHEDULE:			
Fan/AHU Schedule:	Mon.-Fri.:	Schedule:	To
	Sat./Sun.:		To
Chiller Schedule:	Mon.-Fri.:	Schedule:	To
	Sat./Sun.:		To
Boiler Schedule:	Mon.-Fri.:	Schedule:	To
	Sat./Sun.:		To
Aux. Equipment Schedule:			
	Mon.-Fri.:	Schedule:	To
	Sat./Sun.:		To
	Mon.-Fri.:	Schedule:	To
	Sat./Sun.:		To
Comments:			

Building No: _____ Building Name: _____

BUILDING ENVELOPE

EXTERIOR WALLS		
Wall Direction (N, E, W, or S)	Wall Construction No.	Comments

LIST OF EXT. WALL CONSTRUCTION TYPES	
Wall Construction No.	Description
XW-1	Face Brick & CMU
XW-2	Face Brick, CMU, & Gyp. Board
XW-3	Face Brick, CMU, & Ceramic Tile
XW-4	Face Brick, CMU, & Plaster Coat
XW-5	Insulated Metal Panel
XW-6	
XW-7	
XW-8	

WINDOWS		
Window Direction (N, E, W, or S)	Window Construction No.	Comments

LIST OF WINDOW TYPES	
Window Construction No.	Description
W-1	Double Pane Clear
W-2	Double Pane Tinted
W-3	Single Pane with Storm Windows
W-4	Single Pane
W-5	
W-6	
W-7	
W-8	

ROOF CONSTRUCTION		
Roof Direction (N, E, W, or S)	Roof Construction No.	Comments

LIST OF ROOF CONSTRUCTION TYPES	
Roof Construction No.	Description
R-1	BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile
R-2	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Ceiling Tile
R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Ceiling
R-4	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plaster Ceiling
R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceiling Tile
R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaster Ceiling
R-7	
R-8	

Building No: _____ **Building Name:** _____

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

INTERIOR EQUIPMENT AND OBJECTS				LIST OF EQUIPMENT AND OBJECTS	
Wall Direction (N, E, W, or S)	Item No.	No. of Items	Comments	Item No.	Description
					Architectural
				A-1	Interior Partitions
				A-2	Wall Placards
				A-3	Drapery Valances
				A-4	Drapery Rods
				A-5	
				A-6	
					Plumbing
				P-1	Sinks
				P-2	Commodes
				P-3	Toilet Stalls
				P-4	Water Fountains
				P-5	
				P-6	
					HVAC Mechanical
				M-1	Floor Supply/Return Grilles
				M-2	Ceiling Supply/Return Grilles
				M-3	Finned-Tube Baseboard Radiators
				M-4	Thermostats / Space Temp. Sensors
				M-5	
				M-6	
				M-7	
					Electrical
				E-1	Electrical Panels
				E-2	Electrical Outlets
				E-3	Electrical Light Switches
				E-4	
				E-5	
				E-6	
				E-7	
					Lighting
				L-1	Wall Mounted Fixtures
				L-2	Ceiling Mounted Fixtures
				L-3	Exit Signs
				L-4	
				L-5	
					Fire Protection
				F-1	Alarm Pull Switches
				F-2	Alarm Sound Devices (Speakers, Bells)
				F-3	Sprinkler Heads
				F-4	Fire Extinguishes
				F-5	
				F-6	
					Communication
				C-1	Telephones - Wall Mounted
				C-2	Telephones - Booth Mounted
				C-3	Telephone Jacks
				C-4	
				C-5	

EMC ENGINEERS, INC.

2750 South Wadsworth Blvd. • Suite C-200
Denver, Colorado 80227-3400
303/988-2951 • Fax: 303/985-2527

CONFIRMATION NOTICE

Confirmation Notice No. 2 EMC #1406.011

DATE: 27 November 1995

PROJECT: Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, Missouri

CONTRACT NO.: DACA 01-94-D-0033, Del. Ord. 0009

NOTES PREPARED BY: Alan Niemeyer, E M C Engineers, Inc.

DATE OF MEETING: 8 November 1995

PLACE OF MEETING: Building 2101, Fort Leonard Wood, Missouri

SUBJECT: Exit Interview Meeting

ATTENDEES:

Douglas Cage	Directorate of Public Works (DPW) Energy, Fort Leonard Wood	(314) 596-0869
Alan Niemeyer	EMC Engineers, Inc.	(303) 988-2951
David Sinz	EMC Engineers, Inc.	(303) 988-2951

Mr. Niemeyer stated that few problems were encountered thus far during the field survey. Most people at the buildings being surveyed had been helpful.

Mr. Niemeyer stated that relocation of baseboard radiation and fan coil units may be feasible for the insulation upgrade on walls. The cost for relocation of this equipment will be included in the study.

Mr. Niemeyer stated that EMC had obtained needed information from DPW including the following:

- utility rates
- list of buildings connected to the energy monitoring control system

- copies of drawings requested by EMC from DPW.

Mr. Niemeyer asked if Mr. Cage had any special areas for consideration to be included in the study. Mr. Cage said EMC should evaluate installing insulation over existing insulated panels above windows. Also, Mr. Cage said that an SIR in the range of 4.0 would be a target SIR for a project that would be competitive for funding.

Alan J. Niemeyer
Project Engineer, E M C Engineers, Inc.

BRAD ADAMS WALKER
ARCHITECTURE, P.C.

201 FILLMORE STREET • SUITE 201 • DENVER CO 80206
(303) 388-9500 FAX (303) 388-2305

17 January 1996

Mr. Alan J. Niemeyer
EMC Engineers, Inc.
2750 South Wadsworth Blvd., Suite C-200
Denver, CO 80227-3400

Re: ARMY ENGINEER DISTRICT, MOBILE, ALABAMA
Limited Energy Study - Insulate Brick Buildings
Fort Leonard Wood, Missouri
DACA01-94-D-0033
Delivery Order No. 0009
EMC Project No. 1406-011
BAW Project No. 95020.00
Recommendation Letter

Dear Alan,

We are writing this letter to outline insulation recommendations for Fort Leonard Wood, Missouri. These recommendations are intended to support a Limited Energy Study being developed by EMC Engineers, Inc. The project incorporates one hundred buildings. However, the scope of this letter is limited to five building types: Administration, Mess Hall, Barracks, Gymnasium, and a Chapel. Recommendations for each of these building types shall be extrapolated by EMC to the one hundred buildings. This method shall allow EMC to factor cost estimates for each building type as part of the study.

The scope of these preliminary recommendations is limited to discussions with your office, review of existing photographs, and review of drawings of each building type. The scope does not include site observation and investigation of the buildings included in this study. In addition, it does not incorporate project design services. Thus, we recommend that each building be reviewed and be analyzed specifically during the design stage of this project. Issues to review during the design stage include clearance issues, materials that meet the architectural guidelines of the base comprehensive plan, and mechanical/electrical coordination.

General Recommendations

The existing "r-value" of the exterior walls for the administration buildings, mess halls, barracks, gymnasiums, and chapels was reported to be "r - 4". The exterior wall of the buildings was observed to be cavity wall construction made of brick masonry, an air space, and concrete masonry units. In order to increase the "r-value" of the perimeter walls, we recommend the following:

1. Provide six inch metal stud construction with three and one-half inch thick batt insulation and a vapor barrier. Install the metal studs adjacent the interior face of the existing walls. Provide an air space between the batt insulation and the existing walls. Finish the interior face with gypsum wall board. Paint the gypsum wall board to match the adjacent surfaces. Provide rubber base.

2. If there are clearance issues to resolve, consider installing furring channels with rigid insulation and gypsum wall board. Provide an air space to separate the insulation from the existing masonry walls. Finish the gypsum wall board with paint to match adjacent surfaces. Provide rubber base.

3. For bathroom areas, in lieu of the gypsum wall board noted above, install ceramic wall tile on water resistant gypsum wall board. During review of the existing drawings, it was noted that plumbing fixtures and piping may require relocation in order to insulate the perimeter walls. Provide ceramic tile base, in lieu of rubber base.

4. For shower and kitchen areas, in lieu of gypsum wall board noted above, provide tile on cementitious backer board. Provide ceramic tile base, in lieu of rubber base.

5. For fire rated assemblies, provide fire resistive, type X, gypsum wall board wall construction as acceptable to the governing code authority.

6. In order to accomplish the perimeter wall construction, approximately four feet (minimum) of ceiling will need to be replaced. Estimate areas to be patched with like materials. Consider acoustical tile and grid for administration areas and plaster patching for hard surfaced ceiling areas.

7. Reconfigure spaces in order to maintain clearance issues.

Mess Hall Considerations

During the review of existing photographs and drawings, it was noted that the kitchen equipment would need to be modified in order to insulate the perimeter walls.

Barracks Considerations

The interior faces of walls in the barracks are made of concrete masonry units. These walls are extremely durable. If the perimeter walls are insulated, provide cementitious backer board in lieu of gypsum wall board. If the budget allows, finish the cementitious backer board with ceramic tile.

Gymnasium Considerations

Provide a durable wall material for added wall construction in the gymnasium and racquetball courts.

Chapel Considerations

Maintain or replace existing wood finishes in order to insulate the existing walls. We recommend further coordination of finishes and materials for these design sensitive areas.

If you have any questions about the above, please don't hesitate to contact me at our office.

Very truly yours,
BRAD ADAMS WALKER ARCHITECTURE, P.C.

John T. Tindall
Project Manager

cc: BAW B. Walker
BAW File

EMC ENGINEERS, INC.

2750 South Wadsworth Blvd. • Suite C-200
Denver, Colorado 80227-3400
303/988-2951 • Fax: 303/985-2527

CONFIRMATION NOTICE

Confirmation Notice No. 3 EMC #1406.011

DATE: 14 May 1996

PROJECT: Limited Energy Study, Insulate Brick Buildings, Ft. Leonard Wood, Mo.

CONTRACT NO.: DACA 01-94-D-0033, Delivery Order No. 0009

PREPARED BY: Alan Niemeyer, E M C Engineers, Inc.

SUBJECT: Interim Submittal Review Comments

Review comments were received for the Interim Submittal from the following organizations:

- U.S. Army Engineer District, Kansas City, MO
- U.S. Army Engineer District, Mobile, AL

The responses to the review comments are as follows:

Comments from Ms. Hoban, U.S. Army Engineer District, Kansas City, MO:

1. Comment #1. Annotation: CONCUR. Reference to economic summary table will be corrected.

2. Comment #2. Annotation: DISAGREE. The scope of this energy study evaluates specific Energy Conservation Opportunities (ECOs) to determine their energy savings potential and economic feasibility. The Architectural and Engineering Instructions Design Criteria CEMP-E, dated 3 July 1994, paragraph 3.d.3, page 11-4 refers to design guidelines which are used to determine design heating and cooling loads for buildings. Paragraph 3.d.3 states that "Process loads will not be included", which is good engineering practice when calculating design heating and cooling loads. However, the scope of this energy study does not evaluate the design heating and cooling loads for the buildings, but does evaluate the existing building energy use and the energy savings that can accrue by implementing ECOs.

   Process loads (such as personal computers, printers, copy machines, microwave ovens, refrigerators, etc.) generate heat gain to the buildings space. The heat gain from process loads will affect the buildings energy use by decreasing heating loads and increasing cooling loads. The process loads must be included in the energy analysis to accurately reflect the buildings energy use.

In this study, energy savings are calculated by subtracting the Energy Conservation Opportunity (ECO) energy use from the Baseline energy use. The process loads remain the same in both the ECO and the Baseline, and therefore do not contribute to the energy savings.

3. Comment #3. Annotation: INFO. The electrical demand includes the process loads. Refer to the discussion in Comment #2. The process loads remain the same in both the ECO and the Baseline, and therefore do not contribute to the electrical demand savings.

4. Comment #4. Annotation: INFO. The unit costs of electricity and natural gas were provided to EMC by the Directorate of Public Works at Fort Leonard Wood. The unit costs reflect their billing records.

Comments from Robert S. Woodruff, EN-DM, Mobile District, AL:

5. Comment #1. Annotation: CONCUR. Additional verbiage will be included to clarify why equipment and objects on or near exterior walls were surveyed and documented.

6. Comment #2. Annotation: INFO. The lowest life cycle cost in each of the three categories occurs for the 0 in. thickness. However, the report states that the lowest life cycle costs for insulation installed are indicated by the shaded areas.

7. Comment #3. Annotation: CONCUR. The last paragraph on page 2-1 addresses the electrical demand. Additional verbiage will be added to the previous paragraph to clearly state the unit cost of electricity.

8. Comment #4. Annotation: CONCUR

Alan J. Niemeyer
Project Engineer, E M C Engineers, Inc.

Attachments: Government Review Comments

cc:

David E. Werner	Allen Simpson	Tony Battaglia	Mr. Jagasits
Mr. Hill	Dennis Jones	File	

If any portion of this Confirmation Notice is incorrect, please notify us immediately. If correspondence is not received to the contrary within 14 days, it will be assumed that the decisions, conclusions, and status outlined in this Confirmation Notice are correct.

Thursday April 4, 1996 Page: 1
st Sort Type = None

LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS, FT. LW MO

File: N:\RV\PROJECTS\LENGSTDY.DBF

Num	Name	Office	Page/Sheet	Discipline	Rm/Detail
1	HOBAN	EP-DL	ES-5	MEC	

PARAGRAPH AHEAD OF THE "RECOMMENDATIONS" REFER TO TABLE ES-3 ON PAGE ES-6. THIS SHOULD BE TABLE ES-4.

Num	Name	Office	Page/Sheet	Discipline	Rm/Detail
2	HOBAN	EP-DL	SECTION 5	MEC	

IT APPEARS THAT ON ALL OF THE STUDIES THAT THE PROCESS LOAD HAS BEEN INCLUDED IN THE ENERGY USAGE ANALYSIS.

THE AEI (ARCHITECTUAL and ENGINEERING INSTRUCTIONS) DESIGN CRITERIA, CHAPTER 11, PARAGRAPH 3.d.3 (PG 11-4) STATES THAT "PROCESS LOADS WILL NOT BE INCLUDED."

PLEASE REVISE THE STUDY TO ELIMINATE THE PROCESS LOADS FROM THE ENERGY USAGE FIGURES, THE ELECTRICAL DEMAND, AND ALL THE ASSOCIATED COSTS.

Num	Name	Office	Page/Sheet	Discipline	Rm/Detail
3	HOBAN	EP-DL	SECTIONS 1-9	MEC	

DOES THE PEAK ELECTRICAL DEMAND INCLUDE THE PROCESS LOADS?
SEE PREVIOUS COMMENT.

Num	Name	Office	Page/Sheet	Discipline	Rm/Detail
4	HOBAN	EP-DL	ENERGY COST	MEC	

PLEASE VERIFY THE COST OF THE ELECTRICITY AND GAS. THE GAS COST SEEMS LOW FOR THE AREA.

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 1

To ALAN NIEMEXER	From DAVID WERNER
Co. EMC ENGINEERING	Co. CEMRK-EP-DI
Dept. DENVER, CO.	Phone # 816 426 2597
Fax # 303 985 2527	Fax # 816 426 3690

MOBILE DISTRICT PROJECT REVIEW COMMENTS:	DATE: 10 May 1996	Page 1 of 1
TO: U. S. Army Corps of Engineers Kansas City District Attn: Dave Werner	FROM: Robert S. Woodruff, CESAM-EN-DM Phone: (334) 694-6074 FAX: (334) 690-2424	
PROJECT/FY: Insulate Brick Buildings		
LOCATION: Fort Leonard Wood Missouri		
TYPE REVIEW: Interim Report		

NO.	Page/Par	COMMENT	Response to Comment
1.	Page ES-1	The first paragraph under "Approach" states that objects on or near exterior walls were documented. At first the need to do this doesn't make sense but is explained later in the report. Because many people will only read the executive summary the reason why this documentation was necessary should be put in the executive summary.	
2.	Page ES-3	Based on the information presented in Table ES-1 isn't the lowest life cycle cost for all three situations 0 in. thickness, not the shaded value ?	
3.	Page 2-1	The energy cost of electricity should be added to the last paragraph.	
4.	General	Based on the fact that none of the ECO's meet the minimum criteria for implementation the AE should issue the final report but the final report presentation should be canceled.	

APPENDIX B

BEACON ENERGY ANALYSIS PROGRAM DESCRIPTION

APPENDIX B
BEACON ENERGY ANALYSIS PROGRAM

The BEACON energy analysis program was developed by Energy Systems Engineers, Inc. of Denver, Colorado.

BEACON is a multizone building energy program that computes yearly heating and cooling energy requirements for each hour of the year. Solar, direct gain, indirect gain, insolated gain, and hybrid passive solar buildings can be simulated as well as conventional buildings.

The number of zones that can be simulated is limited only by the capacity of the disk drive on which the output file is written. A run may consist of one base case zone followed by several reruns of the zone with different options, or several different zones on a single system.

The program was originally designed to provide quick energy analyses of building envelope options, to aid in selection of the most cost effective configuration. However, BEACON can be used for many purposes including equipment selection and energy conservation studies for existing buildings.

BEACON uses transfer functions as defined in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 1977 and 1985 Handbook of Fundamentals to compute heat loss or gain through walls and roofs. All of the ASHRAE transfer functions are contained in the program so that all the user has to do is select the desired configuration and input the code number and the program will load the appropriate set of transfer functions. Heat loss or gain through basement walls and floors, concrete slab-on-grade, and partitions can also be included. The internal mass of the building is accounted for with a distinct thermal capacity node that is appropriate connected to the walls, roof, internal air and ground with convective and radiative coupling. Heating and cooling energy required to maintain the internal mass at the desired temperature is introduced into the internal air node.

The program has data for sixty different glass types that can be called into use by specifying the appropriate number. Solar radiation transmitted through the glass as a function of solar incident angle and absorption in the glass is computed using the glass data.

Several building heating and cooling systems can be simulated, including the on-off control of a residential furnace home, constant air volume with reheat, double duct, indirect/direct evaporative cooling, chilled water storage, variable air volume with economizer, and others.

Internal heat gain for lights, people, and appliances can be profiled so that each hour of the day can be a different value. Heating and cooling thermostats can be set for a different value for each hour of the day, and a different set of values on the weekend.

BEACON can use real weather or synthetic data. The real weather file must be in a format compatible with BEACON. For real weather files, contact Energy Systems Engineers, Inc. The hourly synthetic weather data is generated from monthly average data input to the program.

BEACON has been used extensively by several engineering firms for the past fifteen years. The accuracy and utility of the program has been verified many times over. Anyone familiar with building envelope components and heating and cooling equipment will find BEACON easy to use. This is extremely attractive to anyone who has loaded and run such programs as DOE or BLAST.

APPENDIX C

OPTIMUM INSULATION ANALYSIS
BACKUP DATA

GENERAL

Appendix C contains the backup data for the optimum insulation thickness analysis. The following data is included in the order listed:

- Construction costs for installing wall and roof insulation
- BEACON computer simulations for evaluating optimum thickness for fiberglass batt insulation on walls
- BEACON computer simulations for evaluating optimum thickness for rigid insulation on walls
- BEACON computer simulations for evaluating optimum thickness for fiberglass batt insulation on roofs.

INSULATION COST SUMMARY
FOR LIFE CYCLE COSTS

Install Fiberglass Insulation on Wall ($/Sq Ft)

Item	Thicknesses of Rigid Insulation									
	1 in.		3.5 in.		6 in.		9 in.		12 in.	
	Mat.	Lab.	Mat.	Lab.	Mat.	Lab.	Mat.	Lab.	Mat.	Lab.
Fiberglass Batt Insulation	0.20	0.005	0.19	0.005	0.25	0.005	0.45	0.006	0.61	0.006
Wood Wall Studs	0.35	0.027	0.35	0.027	0.50	0.029	0.85	0.055	0.99	0.057
Gypsum Wall Board	0.21	0.034	0.21	0.034	0.21	0.034	0.21	0.034	0.21	0.034
Wall Painting	0.07	0.010	0.07	0.010	0.07	0.010	0.07	0.010	0.07	0.010
Total Cost per Sq Ft	0.831	0.076	0.821	0.076	1.025	0.078	1.576	0.105	1.880	0.107

Install Rigid Insulation on Wall ($/Sq Ft)

Item	Thicknesses of Rigid Insulation											
	0.75 in.		1 in.		1.5 in.		2 in.		2.5 in.		3 in.	
	Mat.	Lab.	Mat.	Lab.	Mat.	Lab.	Mat.	Lab.	Mat.	Lab.	Mat.	Lab.
Rigid Insulation	0.35	0.010	0.39	0.010	0.48	0.010	0.62	0.011	0.75	0.011	0.88	0.011
Wood Furring Strips	0.20	0.016	0.20	0.016	0.20	0.016	0.20	0.016	0.20	0.016	0.20	0.016
Gypsum Wall Board	0.21	0.017	0.21	0.017	0.21	0.017	0.21	0.017	0.21	0.017	0.21	0.017
Wall Painting	0.07	0.010	0.07	0.010	0.07	0.010	0.07	0.010	0.07	0.010	0.07	0.010
Total Cost per Sq Ft	0.830	0.053	0.870	0.053	0.960	0.053	1.100	0.054	1.230	0.054	1.360	0.054

Install Fiberglass Batt Insulation on Roof ($/Sq Ft)

Item	Thicknesses of Rigid Insulation									
	1 in.		3.5 in.		6 in.		9 in.		12 in.	
	Mat.	Lab.	Mat.	Lab.	Mat.	Lab.	Mat.	Lab.	Mat.	Lab.
Fiberglass Batt Insulation	0.20	0.005	0.22	0.005	0.28	0.006	0.45	0.007	0.61	0.008
Total Cost per Sq Ft	0.200	0.005	0.220	0.005	0.280	0.006	0.450	0.007	0.610	0.008

Fiberglass Batt Insulation on Walls

BLDG 625 - BATTALION HQ BASERUN FOR WALL INSULATION

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.850	.850	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.243	.244	.244
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01837	.01822	.01829	.01829
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00003	.00003	.00003	.00003
N=2	.00283	.00280	.00281	.00281
N=3	.01017	.01008	.01012	.01012
N=4	.00498	.00494	.00496	.00496
N=5	.00037	.00036	.00036	.00036
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	-.07415	-.07415	-.07415	-.07415
N=5	.00212	.00212	.00212	.00212
N=6	********	********	********	********

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.700000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.967892E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .181E-05 .272E-04 .898E-04 .671E-04 .127E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
  9        1.000      .900      1.000     1.000        70.0       76.0
 10        1.000      .900      1.000     1.000        70.0       76.0
 11         .800      .800       .800      .800        70.0       76.0
 12         .500      .500       .400      .400        70.0       76.0
 13         .800      .800       .800      .800        70.0       76.0
 14        1.000      .900      1.000     1.000        70.0       76.0
 15        1.000      .900      1.000     1.000        70.0       76.0
 16        1.000      .900      1.000     1.000        70.0       76.0
 17        1.000      .800      1.000     1.000        70.0       76.0
 18         .200      .200       .100      .100        70.0       76.0
 19         .100      .000       .000      .000        70.0       76.0
 20         .100      .000       .000      .000        70.0       76.0
 21         .100      .000       .000      .000        70.0       76.0
 22         .100      .000       .000      .000        70.0       76.0
 23         .100      .000       .000      .000        70.0       76.0
 24         .100      .000       .000      .000        70.0       76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)     9430.000000
ECONOMIZER HIGH TEMP LIMIT F        68.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)            4
COOLING PLANT RATED OUTPUT BTU (CFLOT)   360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 625 - BATTALION HQ BASERUN FOR WALL INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-76.44	LOSS		-1.11	-8.90	.00	-17.21	-7.08	-73.63	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.06	.00	.00	.00
	-58.92	LOSS		-.92	-7.54	.00	-12.89	-6.02	-62.34	.00
MAR	.94	GAIN	11.72	.00	.00	.00	.78	.00	.00	.02
	-45.15	LOSS		-.82	-7.02	.00	-10.33	-5.59	-56.71	.00
APR	10.37	GAIN	11.93	.01	.04	.00	2.43	.03	.27	1.64
	-16.81	LOSS		-.46	-4.19	.00	-5.08	-3.34	-32.12	.00
MAY	25.19	GAIN	13.07	.03	.14	.00	4.54	.11	.87	6.48
	-1.92	LOSS		-.23	-2.52	.00	-2.16	-1.94	-19.17	.00
JUN	60.32	GAIN	13.17	.09	.40	.00	6.92	.32	2.62	25.49
	.00	LOSS		-.08	-1.19	.00	-.62	-.91	-8.72	.00
JUL	84.51	GAIN	13.38	.18	1.02	.00	9.25	.82	6.90	36.33
	.00	LOSS		-.05	-.73	.00	-.29	-.57	-5.45	.00
AUG	78.93	GAIN	11.73	.13	.77	.00	7.76	.60	4.98	35.96
	.00	LOSS		-.05	-.81	.00	-.36	-.62	-5.27	.00
SEP	43.52	GAIN	10.12	.04	.39	.00	4.51	.32	2.74	19.82
	-2.94	LOSS		-.21	-1.97	.00	-1.94	-1.55	-14.61	.00
OCT	8.73	GAIN	8.62	.00	.06	.00	1.34	.05	.39	2.68
	-14.07	LOSS		-.51	-4.00	.00	-5.62	-3.12	-29.31	.00
NOV	1.48	GAIN	6.92	.00	.00	.00	.31	.00	.00	.40
	-35.41	LOSS		-.74	-5.76	.00	-9.96	-4.49	-43.86	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.01	.00	.00	.00
	-74.67	LOSS		-1.11	-8.71	.00	-17.27	-6.85	-70.54	.00
TOT	314.	GAIN	124.	0.	3.	0.	38.	2.	19.	129.
	-326.	LOSS		-6.	-53.	0.	-84.	-42.	-422.	0.

MAX HEATING LOAD= -272020. BTUH ON DEC 18 HOUR 8 AMBIENT TEMP 1.
MAX COOLING LOAD= 283237. BTUH ON JUL 23 HOUR 14 AMBIENT TEMP 68.

ZONE UA BTU/HR-F 1402.2

BLDG 625 - BATTALION HQ BASERUN FOR WALL INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL INTERNAL HEAT GAIN MILLION BTU
JAN	70.	76.		4	17	62.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	70.	76.		13	17	64.	2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	78.		12	15	72.	3.26	12.57	4.22	23.72
			69.	4	6	15.				
APR	73.	78.		30	16	84.	3.14	12.09	4.08	22.85
			69.	9	6	30.				
MAY	75.	78.		15	15	80.	3.32	12.81	4.22	24.09
			70.	11	6	39.				
JUN	76.	78.		27	15	89.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	77.	78.		13	15	91.	3.26	12.57	4.22	23.72
			73.	10	6	60.				
AUG	77.	78.		30	14	87.	3.32	12.81	4.22	24.09
			71.	25	7	55.				
SEP	75.	78.		11	14	85.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73.	78.		5	15	73.	3.32	12.81	4.22	24.09
			69.	28	6	33.				
NOV	71.	77.		8	16	75.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	74.		12	17	52.	3.20	12.33	4.22	23.35
			67.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ BASERUN FOR WALL INSULATION

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	655	2	1	0	-.2720E+06	.0000
FEB	535	0	0	0	-.2327E+06	.0000
MAR	477	29	0	0	-.2352E+06	.1054E+06
APR	239	149	0	0	-.1465E+06	.1556E+06
MAY	38	317	0	0	-.9830E+05	.1914E+06
JUN	0	482	0	0	.0000	.2522E+06
JUL	0	607	0	0	.0000	.2832E+06
AUG	0	589	0	0	.0000	.2581E+06
SEP	65	367	0	0	-.9600E+05	.2404E+06
OCT	236	130	0	0	-.1368E+06	.1826E+06
NOV	435	39	0	0	-.1979E+06	.1295E+06
DEC	684	0	10	0	-.2720E+06	.0000
YEAR	3364	2711	11	0	-.2720E+06	.2832E+06

SYSTEM TOTALS

MONTH	ENERGY CONSUMPTION HEATING MILLION BTU	COOLING THOUSAND KWH	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FANS THOUSAND KWH	TOTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	107.31	.00	3.32	12.81	1.24	24.09	12.6
FEB	83.80	.00	2.95	11.38	1.12	21.47	12.6
MAR	66.93	.08	3.26	12.57	1.24	23.72	20.8
APR	27.42	.85	3.14	12.09	1.20	22.85	23.8
MAY	3.62	1.96	3.32	12.81	1.24	24.09	26.2
JUN	.00	4.49	3.14	12.09	1.20	22.85	30.7
JUL	.00	6.32	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.91	3.32	12.81	1.24	24.09	31.2
SEP	5.79	3.29	3.08	11.86	1.20	22.48	29.8
OCT	24.49	.70	3.32	12.81	1.24	24.09	25.6
NOV	54.84	.13	3.20	12.33	1.20	23.22	22.2
DEC	106.68	.00	3.20	12.33	1.24	23.35	12.6
YEAR	480.89	23.72	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 153834. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ BASERUN FOR WALL INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2720E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2327E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1054E+06	-.2352E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1556E+06	-.1465E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1914E+06	-.9830E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2522E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2832E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2581E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2404E+06	-.9600E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1826E+06	-.1368E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1295E+06	-.1979E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2720E+06

BLDG 625 - BATTALION HQ INSTALL 1 IN. FIBERGLASS BATT INSULATION

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.850	.850	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.122	.122	.122	.122
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00385	.00385	.00385	.00385
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00042	.00042	.00042	.00042
N=3	.00197	.00197	.00197	.00197
N=4	.00131	.00131	.00131	.00131
N=5	.00015	.00015	.00015	.00015
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	-.14508	-.14508	-.14508	-.14508
N=5	.00613	.00613	.00613	.00613
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.700000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.967892E-04
ROOF B TRANSFER FUNCTIONS (BNR)

.000	.181E-05	.272E-04	.898E-04	.671E-04	.127E-04

ROOF D TRANSFER FUNCTIONS (DNR)

1.00	-1.97	1.36	-.410	.534E-01	-.250E-02

SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
  9        1.000      .900     1.000     1.000        70.0       76.0
 10        1.000      .900     1.000     1.000        70.0       76.0
 11         .800      .800      .800      .800        70.0       76.0
 12         .500      .500      .400      .400        70.0       76.0
 13         .800      .800      .800      .800        70.0       76.0
 14        1.000      .900     1.000     1.000        70.0       76.0
 15        1.000      .900     1.000     1.000        70.0       76.0
 16        1.000      .900     1.000     1.000        70.0       76.0
 17        1.000      .800     1.000     1.000        70.0       76.0
 18         .200      .200      .100      .100        70.0       76.0
 19         .100      .000      .000      .000        70.0       76.0
 20         .100      .000      .000      .000        70.0       76.0
 21         .100      .000      .000      .000        70.0       76.0
 22         .100      .000      .000      .000        70.0       76.0
 23         .100      .000      .000      .000        70.0       76.0
 24         .100      .000      .000      .000        70.0       76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)     9430.000000
ECONOMIZER HIGH TEMP LIMIT F        68.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)            4
COOLING PLANT RATED OUTPUT BTU (CFLOT)   360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 625 - BATTALION HQ INSTALL 1 IN. FIBERGLASS BATT INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-67.94	LOSS		-1.12	-8.92	.00	-8.53	-7.09	-73.78	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.00	.00	.00	.00
	-52.73	LOSS		-.92	-7.57	.00	-6.43	-6.04	-62.52	.00
MAR	.93	GAIN	11.72	.00	.00	.00	.10	.00	.00	.02
	-40.43	LOSS		-.82	-7.03	.00	-4.83	-5.60	-56.79	.00
APR	10.10	GAIN	11.93	.01	.04	.00	.65	.03	.26	1.73
	-15.01	LOSS		-.46	-4.18	.00	-2.07	-3.34	-31.94	.00
MAY	24.08	GAIN	13.07	.03	.14	.00	1.68	.11	.87	6.50
	-1.65	LOSS		-.23	-2.51	.00	-.48	-1.93	-18.84	.00
JUN	57.66	GAIN	13.17	.09	.40	.00	3.15	.32	2.63	25.40
	.00	LOSS		-.08	-1.17	.00	-.01	-.90	-8.16	.00
JUL	79.08	GAIN	13.38	.18	1.02	.00	4.47	.82	6.91	35.30
	.00	LOSS		-.05	-.73	.00	-.02	-.56	-5.37	.00
AUG	73.88	GAIN	11.73	.13	.77	.00	3.73	.60	4.99	34.47
	.00	LOSS		-.05	-.80	.00	-.02	-.62	-5.15	.00
SEP	41.00	GAIN	10.12	.05	.39	.00	1.90	.32	2.74	18.90
	-2.54	LOSS		-.21	-1.97	.00	-.56	-1.54	-14.56	.00
OCT	8.47	GAIN	8.62	.00	.06	.00	.32	.05	.38	2.58
	-12.00	LOSS		-.51	-4.03	.00	-2.46	-3.13	-29.51	.00
NOV	1.56	GAIN	6.92	.00	.00	.00	.03	.00	.00	.44
	-30.84	LOSS		-.74	-5.78	.00	-4.82	-4.50	-44.06	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.00	.00	.00	.00
	-66.16	LOSS		-1.11	-8.72	.00	-8.60	-6.86	-70.66	.00
TOT	297.	GAIN	124.	0.	3.	0.	16.	2.	19.	125.
	-289.	LOSS		-6.	-53.	0.	-39.	-42.	-421.	0.

MAX HEATING LOAD= -270252. BTUH ON DEC 18 HOUR 4 AMBIENT TEMP 1.
MAX COOLING LOAD= 283635. BTUH ON JUL 23 HOUR 14 AMBIENT TEMP 68.

ZONE UA BTU/HR-F 989.3

BLDG 625 - BATTALION HQ INSTALL 1 IN. FIBERGLASS BATT INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL INTERNAL HEAT GAIN MILLION BTU
JAN	70.	77.		4	17	62.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	70.	76.		26	17	60.	2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	77.		12	15	72.	3.26	12.57	4.22	23.72
			69.	4	6	15.				
APR	73.	78.		27	15	74.	3.14	12.09	4.08	22.85
			70.	1	2	34.				
MAY	75.	78.		15	15	80.	3.32	12.81	4.22	24.09
			70.	11	5	39.				
JUN	76.	78.		12	14	85.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	77.	78.		13	15	91.	3.26	12.57	4.22	23.72
			73.	10	6	60.				
AUG	76.	78.		30	14	87.	3.32	12.81	4.22	24.09
			71.	25	6	51.				
SEP	75.	78.		3	13	89.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73.	78.		5	14	77.	3.32	12.81	4.22	24.09
			70.	28	6	33.				
NOV	71.	77.		8	15	76.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	75.		12	16	59.	3.20	12.33	4.22	23.35
			69.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ INSTALL 1 IN. FIBERGLASS BATT INSULATION

	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED		NUMBER OF HOURS WHEN LOADS WERE NOT MET		MAXIMUM LOADS BTU	
MONTH	HEATING	COOLING INCLUDING ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	633	4	0	0	-.2624E+06	.0000
FEB	517	1	0	0	-.2130E+06	.0000
MAR	454	28	0	0	-.2154E+06	.9733E+05
APR	222	142	0	0	-.1322E+06	.1504E+06
MAY	34	303	0	0	-.8618E+05	.1802E+06
JUN	0	448	0	0	.0000	.2404E+06
JUL	0	582	0	0	.0000	.2836E+06
AUG	0	552	0	0	.0000	.2497E+06
SEP	61	347	0	0	-.8579E+05	.2319E+06
OCT	213	126	0	0	-.1252E+06	.1771E+06
NOV	411	42	0	0	-.1787E+06	.1277E+06
DEC	658	0	0	0	-.2703E+06	.0000
YEAR	3203	2575	0	0	-.2703E+06	.2836E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	97.15	.00	3.32	12.81	1.24	24.09	12.6
FEB	76.40	.00	2.95	11.38	1.12	21.47	12.6
MAR	60.85	.08	3.26	12.57	1.24	23.72	20.3
APR	24.86	.84	3.14	12.09	1.20	22.85	23.5
MAY	3.12	1.90	3.32	12.81	1.24	24.09	25.4
JUN	.00	4.31	3.14	12.09	1.20	22.85	29.8
JUL	.00	5.94	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.54	3.32	12.81	1.24	24.09	30.5
SEP	5.19	3.10	3.08	11.86	1.20	22.48	29.1
OCT	21.32	.68	3.32	12.81	1.24	24.09	25.2
NOV	49.14	.13	3.20	12.33	1.20	23.22	22.1
DEC	96.45	.00	3.20	12.33	1.24	23.35	12.6
YEAR	434.48	22.52	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 145123. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ INSTALL 1 IN. FIBERGLASS BATT INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2624E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2130E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9733E+05	-.2154E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1504E+06	-.1322E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1802E+06	-.8618E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2404E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2836E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2497E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2319E+06	-.8579E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1771E+06	-.1252E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1277E+06	-.1787E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2703E+06

BLDG 625 - BATTALION HQ INSTALL 3.5 IN. FIBERGLASS BATT INSULATION

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.850	.850	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.064	.064	.064	.064
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00204	.00204	.00204	.00204
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00022	.00022	.00022	.00022
N=3	.00104	.00104	.00104	.00104
N=4	.00070	.00070	.00070	.00070
N=5	.00008	.00008	.00008	.00008
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	-.14508	-.14508	-.14508	-.14508
N=5	.00613	.00613	.00613	.00613
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.700000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.967892E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .181E-05 .272E-04 .898E-04 .671E-04 .127E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
   9        1.000      .900     1.000     1.000        70.0        76.0
  10        1.000      .900     1.000     1.000        70.0        76.0
  11         .800      .800      .800      .800        70.0        76.0
  12         .500      .500      .400      .400        70.0        76.0
  13         .800      .800      .800      .800        70.0        76.0
  14        1.000      .900     1.000     1.000        70.0        76.0
  15        1.000      .900     1.000     1.000        70.0        76.0
  16        1.000      .900     1.000     1.000        70.0        76.0
  17        1.000      .800     1.000     1.000        70.0        76.0
  18         .200      .200      .100      .100        70.0        76.0
  19         .100      .000      .000      .000        70.0        76.0
  20         .100      .000      .000      .000        70.0        76.0
  21         .100      .000      .000      .000        70.0        76.0
  22         .100      .000      .000      .000        70.0        76.0
  23         .100      .000      .000      .000        70.0        76.0
  24         .100      .000      .000      .000        70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)     9430.000000
ECONOMIZER HIGH TEMP LIMIT F        68.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)   274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)    342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)            4
COOLING PLANT RATED OUTPUT BTU (CFLOT)    360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)     82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 625 - BATTALION HQ INSTALL 3.5 IN. FIBERGLASS BATT INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-64.08	LOSS		-1.12	-8.93	.00	-4.53	-7.10	-73.90	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.00	.00	.00	.00
	-49.90	LOSS		-.93	-7.58	.00	-3.42	-6.05	-62.67	.00
MAR	.98	GAIN	11.72	.00	.00	.00	.05	.00	.00	.03
	-38.44	LOSS		-.82	-7.04	.00	-2.57	-5.61	-56.96	.00
APR	9.99	GAIN	11.93	.01	.04	.00	.34	.03	.26	1.65
	-14.32	LOSS		-.46	-4.19	.00	-1.10	-3.34	-31.95	.00
MAY	23.56	GAIN	13.07	.03	.14	.00	.90	.11	.87	6.43
	-1.61	LOSS		-.23	-2.50	.00	-.26	-1.92	-18.73	.00
JUN	55.06	GAIN	13.17	.09	.40	.00	1.68	.32	2.63	24.03
	.00	LOSS		-.08	-1.16	.00	-.01	-.89	-7.96	.00
JUL	75.23	GAIN	13.38	.18	1.02	.00	2.38	.82	6.92	33.45
	.00	LOSS		-.04	-.72	.00	-.01	-.56	-5.29	.00
AUG	70.50	GAIN	11.73	.13	.77	.00	1.98	.60	4.99	32.71
	.00	LOSS		-.05	-.79	.00	-.01	-.61	-5.06	.00
SEP	39.51	GAIN	10.12	.05	.39	.00	1.01	.32	2.74	18.09
	-2.47	LOSS		-.21	-1.96	.00	-.30	-1.54	-14.53	.00
OCT	8.47	GAIN	8.62	.00	.06	.00	.17	.05	.38	2.57
	-11.22	LOSS		-.51	-4.04	.00	-1.31	-3.14	-29.69	.00
NOV	1.63	GAIN	6.92	.00	.00	.00	.01	.00	.00	.44
	-28.87	LOSS		-.74	-5.79	.00	-2.57	-4.52	-44.24	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.00	.00	.00	.00
	-62.22	LOSS		-1.11	-8.73	.00	-4.56	-6.87	-70.74	.00
TOT	285.	GAIN	124.	0.	3.	0.	9.	2.	19.	119.
	-273.	LOSS		-6.	-53.	0.	-21.	-42.	-422.	0.

MAX HEATING LOAD= -260927. BTUH ON DEC 18 HOUR 4 AMBIENT TEMP 1.
MAX COOLING LOAD= 283257. BTUH ON JUL 23 HOUR 14 AMBIENT TEMP 68.

ZONE UA BTU/HR-F 796.8

BLDG 625 - BATTALION HQ INSTALL 3.5 IN. FIBERGLASS BATT INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	77.		4	17	62.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	71.	76.		26	17	60.	2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	77.		12	15	72.	3.26	12.57	4.22	23.72
			69.	3	6	15.				
APR	73.	78.		24	15	81.	3.14	12.09	4.08	22.85
			70.	14	6	29.				
MAY	75.	78.		15	15	80.	3.32	12.81	4.22	24.09
			70.	11	5	39.				
JUN	76.	78.		12	14	85.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	77.	78.		13	15	91.	3.26	12.57	4.22	23.72
			73.	10	6	60.				
AUG	76.	78.		30	14	87.	3.32	12.81	4.22	24.09
			71.	25	6	51.				
SEP	75.	78.		11	14	85.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73.	78.		5	14	77.	3.32	12.81	4.22	24.09
			70.	28	6	33.				
NOV	71.	77.		8	15	76.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	75.		12	.16	59.	3.20	12.33	4.22	23.35
			69.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ INSTALL 3.5 IN. FIBERGLASS BATT INSULATION

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	620	4	0	0	-.2554E+06	.0000
FEB	504	3	0	0	-.2063E+06	.0000
MAR	441	30	0	0	-.2092E+06	.9752E+05
APR	216	137	0	0	-.1287E+06	.1494E+06
MAY	35	297	0	0	-.8457E+05	.1778E+06
JUN	0	418	0	0	.0000	.2376E+06
JUL	0	545	0	0	.0000	.2833E+06
AUG	0	520	0	0	.0000	.2472E+06
SEP	61	331	0	0	-.8345E+05	.2300E+06
OCT	204	127	0	0	-.1221E+06	.1760E+06
NOV	398	44	0	0	-.1722E+06	.1281E+06
DEC	640	0	0	0	-.2609E+06	.0000
YEAR	3119	2456	0	0	-.2609E+06	.2833E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
MONTH	HEATING MILLION BTU	COOLING THOUSAND KWH	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FANS THOUSAND KWH	HEAT GAIN MILLION BTU	ELECTRIC DEMAND KW
JAN	92.45	.00	3.32	12.81	1.24	24.09	12.6
FEB	72.87	.00	2.95	11.38	1.12	21.47	12.6
MAR	58.16	.09	3.26	12.57	1.24	23.72	20.3
APR	23.89	.83	3.14	12.09	1.20	22.85	23.4
MAY	3.14	1.86	3.32	12.81	1.24	24.09	25.3
JUN	.00	4.11	3.14	12.09	1.20	22.85	29.6
JUL	.00	5.63	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.28	3.32	12.81	1.24	24.09	30.3
SEP	5.13	2.98	3.08	11.86	1.20	22.48	28.9
OCT	20.11	.68	3.32	12.81	1.24	24.09	25.1
NOV	46.62	.14	3.20	12.33	1.20	23.22	22.1
DEC	91.43	.00	3.20	12.33	1.24	23.35	12.6
YEAR	413.80	21.59	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 141005. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ INSTALL 3.5 IN. FIBERGLASS BATT INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2554E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2063E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9752E+05	-.2092E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1494E+06	-.1287E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1778E+06	-.8457E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2376E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2833E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2472E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2300E+06	-.8345E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1760E+06	-.1221E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1281E+06	-.1722E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2609E+06

BLDG 625 - BATTALION HQ INSTALL 6 IN. FIBERGLASS BATT INSULATION

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.850	.850	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.043	.043	.043	.043
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00117	.00117	.00117	.00117
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00010	.00010	.00010	.00010
N=3	.00057	.00057	.00057	.00057
N=4	.00044	.00044	.00044	.00044
N=5	.00006	.00006	.00006	.00006
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	-.16643	-.16643	-.16643	-.16643
N=5	.00728	.00728	.00728	.00728
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.700000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.967892E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .181E-05 .272E-04 .898E-04 .671E-04 .127E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
  9        1.000      .900      1.000      1.000        70.0        76.0
 10        1.000      .900      1.000      1.000        70.0        76.0
 11         .800      .800       .800       .800        70.0        76.0
 12         .500      .500       .400       .400        70.0        76.0
 13         .800      .800       .800       .800        70.0        76.0
 14        1.000      .900      1.000      1.000        70.0        76.0
 15        1.000      .900      1.000      1.000        70.0        76.0
 16        1.000      .900      1.000      1.000        70.0        76.0
 17        1.000      .800      1.000      1.000        70.0        76.0
 18         .200      .200       .100       .100        70.0        76.0
 19         .100      .000       .000       .000        70.0        76.0
 20         .100      .000       .000       .000        70.0        76.0
 21         .100      .000       .000       .000        70.0        76.0
 22         .100      .000       .000       .000        70.0        76.0
 23         .100      .000       .000       .000        70.0        76.0
 24         .100      .000       .000       .000        70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)     9430.000000
ECONOMIZER HIGH TEMP LIMIT F       68.000000
SYSTEM SUPPLY AIR START TIME HR    0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR       24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)      55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)    1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)            4
COOLING PLANT RATED OUTPUT BTU (CFLOT)   360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 625 - BATTALION HQ INSTALL 6 IN. FIBERGLASS BATT INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-62.61	LOSS		-1.12	-8.93	.00	-2.99	-7.11	-73.95	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.00	.00	.00	.00
	-48.81	LOSS		-.93	-7.58	.00	-2.26	-6.06	-62.73	.00
MAR	.99	GAIN	11.72	.00	.00	.00	.03	.00	.00	.03
	-37.67	LOSS		-.82	-7.05	.00	-1.69	-5.62	-57.03	.00
APR	9.98	GAIN	11.93	.01	.04	.00	.21	.03	.26	1.65
	-14.06	LOSS		-.46	-4.19	.00	-.72	-3.34	-31.96	.00
MAY	23.30	GAIN	13.07	.03	.14	.00	.58	.11	.87	6.37
	-1.60	LOSS		-.23	-2.49	.00	-.16	-1.92	-18.69	.00
JUN	53.96	GAIN	13.17	.09	.40	.00	1.11	.32	2.63	23.41
	.00	LOSS		-.08	-1.15	.00	.00	-.88	-7.89	.00
JUL	74.03	GAIN	13.38	.18	1.02	.00	1.57	.82	6.92	33.00
	.00	LOSS		-.04	-.71	.00	.00	-.55	-5.26	.00
AUG	69.37	GAIN	11.73	.13	.77	.00	1.31	.60	4.99	32.20
	.00	LOSS		-.05	-.79	.00	.00	-.61	-5.02	.00
SEP	39.11	GAIN	10.12	.05	.39	.00	.66	.32	2.74	17.95
	-2.43	LOSS		-.21	-1.96	.00	-.19	-1.54	-14.52	.00
OCT	8.43	GAIN	8.62	.00	.06	.00	.11	.05	.38	2.54
	-10.92	LOSS		-.51	-4.04	.00	-.86	-3.15	-29.76	.00
NOV	1.65	GAIN	6.92	.00	.00	.00	.01	.00	.00	.44
	-28.10	LOSS		-.74	-5.80	.00	-1.69	-4.52	-44.31	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.00	.00	.00	.00
	-60.71	LOSS		-1.11	-8.73	.00	-3.02	-6.87	-70.77	.00
TOT	281.	GAIN	124.	0.	3.	0.	6.	2.	19.	118.
	-267.	LOSS		-6.	-53.	0.	-14.	-42.	-422.	0.

MAX HEATING LOAD= -257177. BTUH ON DEC 18 HOUR 4 AMBIENT TEMP 1.
MAX COOLING LOAD= 283131. BTUH ON JUL 23 HOUR 14 AMBIENT TEMP 68.

ZONE UA BTU/HR-F 723.0

BLDG 625 - BATTALION HQ INSTALL 6 IN. FIBERGLASS BATT INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	77.		4	16	63.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	71.	76.		26	17	60.	2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	77.		12	15	72.	3.26	12.57	4.22	23.72
			69.	3	6	15.				
APR	73.	78.		24	15	81.	3.14	12.09	4.08	22.85
			70.	14	6	29.				
MAY	75.	78.		15	15	80.	3.32	12.81	4.22	24.09
			70.	11	5	39.				
JUN	76.	78.		12	14	85.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	76.	78.		13	15	91.	3.26	12.57	4.22	23.72
			72.	10	6	60.				
AUG	76.	78.		30	14	87.	3.32	12.81	4.22	24.09
			71.	25	6	51.				
SEP	75.	78.		11	14	85.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73.	78.		5	14	77.	3.32	12.81	4.22	24.09
			70.	28	5	31.				
NOV	72.	77.		8	15	76.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	75.		12	16	59.	3.20	12.33	4.22	23.35
			69.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ INSTALL 6 IN. FIBERGLASS BATT INSULATION

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	618	5	0	0	-.2526E+06	.0000
FEB	497	5	0	0	-.2036E+06	.0000
MAR	437	30	0	0	-.2067E+06	.9746E+05
APR	213	137	0	0	-.1272E+06	.1489E+06
MAY	34	294	0	0	-.8387E+05	.1768E+06
JUN	0	406	0	0	.0000	.2364E+06
JUL	0	538	0	0	.0000	.2831E+06
AUG	0	509	0	0	.0000	.2462E+06
SEP	61	328	0	0	-.8247E+05	.2293E+06
OCT	203	125	0	0	-.1208E+06	.1756E+06
NOV	390	45	0	0	-.1696E+06	.1281E+06
DEC	636	0	0	0	-.2572E+06	.0000
YEAR	3089	2422	0	0	-.2572E+06	.2831E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	90.84	.00	3.32	12.81	1.24	24.09	12.6
FEB	71.40	.00	2.95	11.38	1.12	21.47	12.6
MAR	57.19	.09	3.26	12.57	1.24	23.72	20.3
APR	23.47	.83	3.14	12.09	1.20	22.85	23.4
MAY	3.06	1.84	3.32	12.81	1.24	24.09	25.2
JUN	.00	4.02	3.14	12.09	1.20	22.85	29.5
JUL	.00	5.54	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.19	3.32	12.81	1.24	24.09	30.3
SEP	5.10	2.95	3.08	11.86	1.20	22.48	28.8
OCT	19.80	.68	3.32	12.81	1.24	24.09	25.1
NOV	45.47	.14	3.20	12.33	1.20	23.22	22.1
DEC	89.72	.00	3.20	12.33	1.24	23.35	12.6
YEAR	406.05	21.27	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 139481. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ INSTALL 6 IN. FIBERGLASS BATT INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2526E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2036E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9746E+05	-.2067E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1489E+06	-.1272E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1768E+06	-.8387E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2364E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2831E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2462E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2293E+06	-.8247E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1756E+06	-.1208E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1281E+06	-.1696E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2572E+06

BLDG 625 - BATTALION HQ INSTALL 9 IN. FIBERGLASS BATT INSULATION

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******

FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.850	.850	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.029	.029	.029	.029
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00080	.00080	.00080	.00080
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00007	.00007	.00007	.00007
N=3	.00039	.00039	.00039	.00039
N=4	.00030	.00030	.00030	.00030
N=5	.00004	.00004	.00004	.00004
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	-.16643	-.16643	-.16643	-.16643
N=5	.00728	.00728	.00728	.00728
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.700000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.967892E-04
ROOF B TRANSFER FUNCTIONS (BNR)

.000	.181E-05	.272E-04	.898E-04	.671E-04	.127E-04

ROOF D TRANSFER FUNCTIONS (DNR)

1.00	-1.97	1.36	-.410	.534E-01	-.250E-02

SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	BTU/HR			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
   9        1.000      .900      1.000     1.000        70.0        76.0
  10        1.000      .900      1.000     1.000        70.0        76.0
  11         .800      .800       .800      .800        70.0        76.0
  12         .500      .500       .400      .400        70.0        76.0
  13         .800      .800       .800      .800        70.0        76.0
  14        1.000      .900      1.000     1.000        70.0        76.0
  15        1.000      .900      1.000     1.000        70.0        76.0
  16        1.000      .900      1.000     1.000        70.0        76.0
  17        1.000      .800      1.000     1.000        70.0        76.0
  18         .200      .200       .100      .100        70.0        76.0
  19         .100      .000       .000      .000        70.0        76.0
  20         .100      .000       .000      .000        70.0        76.0
  21         .100      .000       .000      .000        70.0        76.0
  22         .100      .000       .000      .000        70.0        76.0
  23         .100      .000       .000      .000        70.0        76.0
  24         .100      .000       .000      .000        70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)     9430.000000
ECONOMIZER HIGH TEMP LIMIT F        68.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)            4
COOLING PLANT RATED OUTPUT BTU (CFLOT)   360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 625 - BATTALION HQ INSTALL 9 IN. FIBERGLASS BATT INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-61.69	LOSS		-1.12	-8.94	.00	-2.04	-7.11	-73.98	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.00	.00	.00	.00
	-48.15	LOSS		-.93	-7.59	.00	-1.54	-6.06	-62.78	.00
MAR	.99	GAIN	11.72	.00	.00	.00	.02	.00	.00	.03
	-37.21	LOSS		-.82	-7.05	.00	-1.15	-5.62	-57.07	.00
APR	9.97	GAIN	11.93	.01	.04	.00	.15	.03	.26	1.65
	-13.90	LOSS		-.46	-4.19	.00	-.49	-3.35	-31.97	.00
MAY	23.10	GAIN	13.07	.03	.14	.00	.40	.11	.87	6.28
	-1.59	LOSS		-.23	-2.49	.00	-.11	-1.92	-18.67	.00
JUN	53.56	GAIN	13.17	.09	.40	.00	.76	.32	2.63	23.30
	.00	LOSS		-.08	-1.15	.00	.00	-.88	-7.84	.00
JUL	72.89	GAIN	13.38	.18	1.03	.00	1.07	.82	6.92	32.33
	.00	LOSS		-.04	-.71	.00	.00	-.55	-5.24	.00
AUG	68.40	GAIN	11.73	.13	.77	.00	.89	.60	4.99	31.61
	.00	LOSS		-.05	-.79	.00	.00	-.61	-5.00	.00
SEP	38.70	GAIN	10.12	.05	.39	.00	.45	.32	2.74	17.71
	-2.41	LOSS		-.21	-1.96	.00	-.13	-1.54	-14.52	.00
OCT	8.43	GAIN	8.62	.00	.06	.00	.07	.05	.38	2.54
	-10.74	LOSS		-.51	-4.05	.00	-.59	-3.15	-29.81	.00
NOV	1.67	GAIN	6.92	.00	.00	.00	.00	.00	.00	.44
	-27.64	LOSS		-.74	-5.80	.00	-1.16	-4.52	-44.37	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.00	.00	.00	.00
	-59.78	LOSS		-1.11	-8.74	.00	-2.06	-6.88	-70.79	.00
TOT	278.	GAIN	124.	0.	3.	0.	4.	2.	19.	116.
	-263.	LOSS		-6.	-53.	0.	-9.	-42.	-422.	0.

MAX HEATING LOAD= -255026. BTUH ON DEC 18 HOUR 4 AMBIENT TEMP 1.
MAX COOLING LOAD= 283015. BTUH ON JUL 23 HOUR 14 AMBIENT TEMP 68.

ZONE UA BTU/HR-F 677.5

BLDG 625 - BATTALION HQ INSTALL 9 IN. FIBERGLASS BATT INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	77.		4	16	63.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	71.	77.		26	17	60.	2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	77.		12	15	72.	3.26	12.57	4.22	23.72
			69.	3	6	15.				
APR	73.	78.		24	15	81.	3.14	12.09	4.08	22.85
			70.	14	6	29.				
MAY	75.	78.		15	15	80.	3.32	12.81	4.22	24.09
			70.	11	5	39.				
JUN	76.	78.		12	14	85.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	76.	78.		13	15	91.	3.26	12.57	4.22	23.72
			72.	10	6	60.				
AUG	76.	78.		30	14	87.	3.32	12.81	4.22	24.09
			71.	25	6	51.				
SEP	75.	78.		11	14	85.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73.	78.		5	14	77.	3.32	12.81	4.22	24.09
			70.	28	5	31.				
NOV	72.	77.		8	15	76.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	75.		12	16	59.	3.20	12.33	4.22	23.35
			69.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ INSTALL 9 IN. FIBERGLASS BATT INSULATION

	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED		NUMBER OF HOURS WHEN LOADS WERE NOT MET		MAXIMUM LOADS BTU	
MONTH	HEATING	COOLING INCLUDING ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	615	5	0	0	-.2510E+06	.0000
FEB	496	5	0	0	-.2021E+06	.0000
MAR	433	30	0	0	-.2053E+06	.9755E+05
APR	210	137	0	0	-.1264E+06	.1486E+06
MAY	34	292	0	0	-.8351E+05	.1762E+06
JUN	0	404	0	0	.0000	.2358E+06
JUL	0	526	0	0	.0000	.2830E+06
AUG	0	499	0	0	.0000	.2456E+06
SEP	61	324	0	0	-.8193E+05	.2289E+06
OCT	202	126	0	0	-.1200E+06	.1754E+06
NOV	385	45	0	0	-.1681E+06	.1283E+06
DEC	635	0	0	0	-.2550E+06	.0000
YEAR	3071	2393	0	0	-.2550E+06	.2830E+06

SYSTEM TOTALS

MONTH	ENERGY CONSUMPTION HEATING MILLION BTU	COOLING THOUSAND KWH	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FANS THOUSAND KWH	TOTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	89.75	.00	3.32	12.81	1.24	24.09	12.6
FEB	70.69	.00	2.95	11.38	1.12	21.47	12.6
MAR	56.51	.09	3.26	12.57	1.24	23.72	20.3
APR	23.13	.83	3.14	12.09	1.20	22.85	23.4
MAY	3.05	1.83	3.32	12.81	1.24	24.09	25.2
JUN	.00	3.99	3.14	12.09	1.20	22.85	29.5
JUL	.00	5.45	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.11	3.32	12.81	1.24	24.09	30.2
SEP	5.09	2.92	3.08	11.86	1.20	22.48	28.7
OCT	19.58	.68	3.32	12.81	1.24	24.09	25.1
NOV	44.77	.14	3.20	12.33	1.20	23.22	22.1
DEC	88.76	.00	3.20	12.33	1.24	23.35	12.6
YEAR	401.34	21.03	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 138522. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ INSTALL 9 IN. FIBERGLASS BATT INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	DRIFT F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2510E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2021E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9755E+05	-.2053E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1486E+06	-.1264E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1762E+06	-.8351E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2358E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2830E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2456E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2289E+06	-.8193E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1754E+06	-.1200E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1283E+06	-.1681E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2550E+06

BLDG 625 - BATTALION HQ INSTALL 12 IN. FIBERGLASS BATT INSULATION

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.850	.850	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) . 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.023	.023	.023	.023
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00065	.00065	.00065	.00065
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00006	.00006	.00006	.00006
N=3	.00032	.00032	.00032	.00032
N=4	.00024	.00024	.00024	.00024
N=5	.00003	.00003	.00003	.00003
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	-.16643	-.16643	-.16643	-.16643
N=5	.00728	.00728	.00728	.00728
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.700000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.967892E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .181E-05 .272E-04 .898E-04 .671E-04 .127E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	BTU/HR			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
  9        1.000      .900     1.000     1.000        70.0        76.0
 10        1.000      .900     1.000     1.000        70.0        76.0
 11         .800      .800      .800      .800        70.0        76.0
 12         .500      .500      .400      .400        70.0        76.0
 13         .800      .800      .800      .800        70.0        76.0
 14        1.000      .900     1.000     1.000        70.0        76.0
 15        1.000      .900     1.000     1.000        70.0        76.0
 16        1.000      .900     1.000     1.000        70.0        76.0
 17        1.000      .800     1.000     1.000        70.0        76.0
 18         .200      .200      .100      .100        70.0        76.0
 19         .100      .000      .000      .000        70.0        76.0
 20         .100      .000      .000      .000        70.0        76.0
 21         .100      .000      .000      .000        70.0        76.0
 22         .100      .000      .000      .000        70.0        76.0
 23         .100      .000      .000      .000        70.0        76.0
 24         .100      .000      .000      .000        70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)     9430.000000
ECONOMIZER HIGH TEMP LIMIT F        68.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)            4
COOLING PLANT RATED OUTPUT BTU (CFLOT)   360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 625 - BATTALION HQ INSTALL 12 IN. FIBERGLASS BATT INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-61.33	LOSS		-1.12	-8.94	.00	-1.65	-7.11	-73.99	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.00	.00	.00	.00
	-47.88	LOSS		-.93	-7.59	.00	-1.25	-6.06	-62.80	.00
MAR	.99	GAIN	11.72	.00	.00	.00	.02	.00	.00	.03
	-37.02	LOSS		-.82	-7.05	.00	-.94	-5.62	-57.09	.00
APR	9.97	GAIN	11.93	.01	.04	.00	.12	.03	.26	1.65
	-13.83	LOSS		-.46	-4.19	.00	-.40	-3.35	-31.97	.00
MAY	23.05	GAIN	13.07	.03	.14	.00	.32	.11	.87	6.28
	-1.58	LOSS		-.23	-2.49	.00	-.09	-1.92	-18.66	.00
JUN	53.34	GAIN	13.17	.09	.40	.00	.61	.32	2.63	23.20
	.00	LOSS		-.08	-1.14	.00	.00	-.88	-7.82	.00
JUL	72.41	GAIN	13.38	.18	1.03	.00	.87	.82	6.92	32.04
	.00	LOSS		-.04	-.71	.00	.00	-.55	-5.23	.00
AUG	67.92	GAIN	11.73	.13	.77	.00	.72	.60	4.99	31.30
	.00	LOSS		-.05	-.79	.00	.00	-.61	-5.00	.00
SEP	38.58	GAIN	10.12	.05	.39	.00	.37	.32	2.74	17.65
	-2.41	LOSS		-.21	-1.96	.00	-.10	-1.54	-14.52	.00
OCT	8.43	GAIN	8.62	.00	.06	.00	.06	.05	.38	2.54
	-10.66	LOSS		-.51	-4.05	.00	-.48	-3.15	-29.83	.00
NOV	1.67	GAIN	6.92	.00	.00	.00	.00	.00	.00	.44
	-27.45	LOSS		-.74	-5.80	.00	-.94	-4.53	-44.38	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.00	.00	.00	.00
	-59.40	LOSS		-1.11	-8.74	.00	-1.67	-6.88	-70.80	.00
TOT	276.	GAIN	124.	0.	3.	0.	3.	2.	19.	115.
	-262.	LOSS		-6.	-53.	0.	-8.	-42.	-422.	0.

MAX HEATING LOAD= -254152. BTUH ON DEC 18 HOUR 4 AMBIENT TEMP 1.
MAX COOLING LOAD= 282969. BTUH ON JUL 23 HOUR 14 AMBIENT TEMP 68.

ZONE UA BTU/HR-F 659.0

BLDG 625 - BATTALION HQ INSTALL 12 IN. FIBERGLASS BATT INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	77.		4	16	63.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	71.	77.		26	17	60.	2.95	11.38	3.81	21.47
			69.	2	5	14.				
MAR	71.	77.		12	15	72.	3.26	12.57	4.22	23.72
			69.	3	6	15.				
APR	73.	78.		24	15	81.	3.14	12.09	4.08	22.85
			70.	14	6	29.				
MAY	75.	78.		15	15	80.	3.32	12.81	4.22	24.09
			70.	11	5	39.				
JUN	76.	78.		12	14	85.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	76.	78.		13	15	91.	3.26	12.57	4.22	23.72
			72.	10	6	60.				
AUG	76.	78.		30	14	87.	3.32	12.81	4.22	24.09
			71.	25	6	51.				
SEP	75.	78.		11	14	85.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73.	78.		5	14	77.	3.32	12.81	4.22	24.09
			70.	28	5	31.				
NOV	72.	77.		8	15	76.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	75.		12	16	59.	3.20	12.33	4.22	23.35
			69.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ INSTALL 12 IN. FIBERGLASS BATT INSULATION

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	615	5	0	0	-.2504E+06	.0000
FEB	493	5	0	0	-.2014E+06	.0000
MAR	431	31	0	0	-.2047E+06	.9758E+05
APR	209	137	0	0	-.1260E+06	.1485E+06
MAY	34	292	0	0	-.8337E+05	.1760E+06
JUN	0	402	0	0	.0000	.2355E+06
JUL	0	521	0	0	.0000	.2830E+06
AUG	0	494	0	0	.0000	.2453E+06
SEP	61	323	0	0	-.8172E+05	.2287E+06
OCT	201	126	0	0	-.1197E+06	.1753E+06
NOV	379	45	0	0	-.1674E+06	.1284E+06
DEC	631	0	0	0	-.2542E+06	.0000
YEAR	3054	2381	0	0	-.2542E+06	.2830E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	89.38	.00	3.32	12.81	1.24	24.09	12.6
FEB	70.23	.00	2.95	11.38	1.12	21.47	12.6
MAR	56.21	.09	3.26	12.57	1.24	23.72	20.3
APR	23.02	.83	3.14	12.09	1.20	22.85	23.3
MAY	3.04	1.82	3.32	12.81	1.24	24.09	25.1
JUN	.00	3.97	3.14	12.09	1.20	22.85	29.5
JUL	.00	5.41	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.07	3.32	12.81	1.24	24.09	30.2
SEP	5.09	2.91	3.08	11.86	1.20	22.48	28.7
OCT	19.46	.68	3.32	12.81	1.24	24.09	25.1
NOV	44.24	.14	3.20	12.33	1.20	23.22	22.1
DEC	88.17	.00	3.20	12.33	1.24	23.35	12.6
YEAR	398.86	20.92	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 138031. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ INSTALL 12 IN. FIBERGLASS BATT INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM NOT MET COOL	HOURS WHEN SYSTEM NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2504E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2014E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9758E+05	-.2047E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1485E+06	-.1260E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1760E+06	-.8337E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2355E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2830E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2453E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2287E+06	-.8172E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1753E+06	-.1197E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1284E+06	-.1674E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2542E+06

Rigid Insulation on Walls

BLDG 625 - BATTALION HQ INSTALL 3/4 IN. RIGID INSULATION

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA --------------

******REAL WEATHER FROM DISK*******

FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.850	.850	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW (HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.079	.079	.079	.079
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00044	.00044	.00044	.00044
NUMBER OF BN FACTORS (NB	6	6	6	6
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00000	.00000	.00000	.00000
N=3	.00004	.00004	.00004	.00004
N=4	.00017	.00017	.00017	.00017
N=5	.00018	.00018	.00018	.00018
N=6	.00005	.00005	.00005	.00005
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-2.50527	-2.50527	-2.50527	-2.50527
N=3	2.30575	2.30575	2.30575	2.30575
N=4	-.97167	-.97167	-.97167	-.97167
N=5	.19281	.19281	.19281	.19281
N=6	-.01643	-.01643	-.01643	-.01643

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.700000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.967892E-04
ROOF B TRANSFER FUNCTIONS (BNR)

.000	.181E-05	.272E-04	.898E-04	.671E-04	.127E-04

ROOF D TRANSFER FUNCTIONS (DNR)

1.00	-1.97	1.36	-.410	.534E-01	-.250E-02

SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW - - - - - - BTU/HR - - - - - -				THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
  9        1.000      .900     1.000     1.000        70.0       76.0
 10        1.000      .900     1.000     1.000        70.0       76.0
 11         .800      .800      .800      .800        70.0       76.0
 12         .500      .500      .400      .400        70.0       76.0
 13         .800      .800      .800      .800        70.0       76.0
 14        1.000      .900     1.000     1.000        70.0       76.0
 15        1.000      .900     1.000     1.000        70.0       76.0
 16        1.000      .900     1.000     1.000        70.0       76.0
 17        1.000      .800     1.000     1.000        70.0       76.0
 18         .200      .200      .100      .100        70.0       76.0
 19         .100      .000      .000      .000        70.0       76.0
 20         .100      .000      .000      .000        70.0       76.0
 21         .100      .000      .000      .000        70.0       76.0
 22         .100      .000      .000      .000        70.0       76.0
 23         .100      .000      .000      .000        70.0       76.0
 24         .100      .000      .000      .000        70.0       76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)     9430.000000
ECONOMIZER HIGH TEMP LIMIT F        68.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)            4
COOLING PLANT RATED OUTPUT BTU (CFLOT)   360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 625 - BATTALION HQ INSTALL 3/4 IN. RIGID INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-65.55	LOSS		-1.12	-8.92	.00	-6.07	-7.10	-73.84	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.00	.00	.00	.00
	-51.07	LOSS		-.92	-7.57	.00	-4.69	-6.05	-62.58	.00
MAR	.95	GAIN	11.72	.00	.00	.00	.01	.00	.00	.03
	-39.19	LOSS		-.82	-7.03	.00	-3.46	-5.60	-56.82	.00
APR	9.88	GAIN	11.93	.01	.04	.00	.23	.03	.26	1.68
	-14.60	LOSS		-.46	-4.18	.00	-1.51	-3.34	-31.87	.00
MAY	23.54	GAIN	13.07	.03	.14	.00	.93	.11	.87	6.43
	-1.61	LOSS		-.23	-2.50	.00	-.28	-1.92	-18.74	.00
JUN	56.02	GAIN	13.17	.09	.40	.00	2.00	.32	2.63	24.72
	.00	LOSS		-.08	-1.16	.00	.00	-.89	-8.00	.00
JUL	76.61	GAIN	13.38	.18	1.02	.00	2.93	.82	6.91	34.32
	.00	LOSS		-.05	-.72	.00	-.01	-.56	-5.34	.00
AUG	71.44	GAIN	11.73	.13	.77	.00	2.42	.60	4.99	33.26
	.00	LOSS		-.05	-.80	.00	.00	-.61	-5.11	.00
SEP	39.93	GAIN	10.12	.05	.39	.00	1.16	.32	2.74	18.40
	-2.46	LOSS		-.21	-1.96	.00	-.34	-1.54	-14.53	.00
OCT	8.31	GAIN	8.62	.00	.06	.00	.13	.05	.38	2.51
	-11.49	LOSS		-.51	-4.03	.00	-1.76	-3.14	-29.57	.00
NOV	1.55	GAIN	6.92	.00	.00	.00	.00	.00	.00	.44
	-29.56	LOSS		-.74	-5.78	.00	-3.49	-4.51	-44.10	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.00	.00	.00	.00
	-63.79	LOSS		-1.11	-8.72	.00	-6.19	-6.87	-70.69	.00
TOT	288.	GAIN	124.	0.	3.	0.	10.	2.	19.	122.
	-279.	LOSS		-6.	-53.	0.	-28.	-42.	-421.	0.

MAX HEATING LOAD= -261632. BTUH ON DEC 18 HOUR 4 AMBIENT TEMP 1.
MAX COOLING LOAD= 283788. BTUH ON JUL 23 HOUR 14 AMBIENT TEMP 68.

ZONE UA BTU/HR-F 845.0

BLDG 625 - BATTALION HQ INSTALL 3/4 IN. RIGID INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	77.		4	17	62.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	71.	76.		26	17	60.	2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	77.		12	15	72.	3.26	12.57	4.22	23.72
			69.	4	6	15.				
APR	73.	77.		27	15	74.	3.14	12.09	4.08	22.85
			70.	1	1	33.				
MAY	75.	78.		15	15	80.	3.32	12.81	4.22	24.09
			70.	11	5	39.				
JUN	76.	78.		12	14	85.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	77.	78.		13	15	91.	3.26	12.57	4.22	23.72
			73.	10	6	60.				
AUG	76.	78.		30	14	87.	3.32	12.81	4.22	24.09
			71.	25	6	51.				
SEP	75.	78.		3	13	89.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73.	78.		5	14	77.	3.32	12.81	4.22	24.09
			70.	28	5	31.				
NOV	71.	77.		8	15	76.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	75.		12	16	59.	3.20	12.33	4.22	23.35
			69.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ INSTALL 3/4 IN. RIGID INSULATION

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	626	4	0	0	-.2560E+06	.0000
FEB	512	2	0	0	-.2075E+06	.0000
MAR	447	29	0	0	-.2096E+06	.9517E+05
APR	222	137	0	0	-.1291E+06	.1489E+06
MAY	34	299	0	0	-.8413E+05	.1771E+06
JUN	0	427	0	0	.0000	.2379E+06
JUL	0	560	0	0	.0000	.2838E+06
AUG	0	530	0	0	.0000	.2474E+06
SEP	62	335	0	0	-.8299E+05	.2315E+06
OCT	209	124	0	0	-.1224E+06	.1758E+06
NOV	401	43	0	0	-.1731E+06	.1262E+06
DEC	647	0	0	0	-.2616E+06	.0000
YEAR	3160	2490	0	0	-.2616E+06	.2838E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	94.28	.00	3.32	12.81	1.24	24.09	12.6
FEB	74.41	.00	2.95	11.38	1.12	21.47	12.6
MAR	59.18	.08	3.26	12.57	1.24	23.72	20.2
APR	24.50	.82	3.14	12.09	1.20	22.85	23.4
MAY	3.08	1.86	3.32	12.81	1.24	24.09	25.2
JUN	.00	4.18	3.14	12.09	1.20	22.85	29.6
JUL	.00	5.74	3.26	12.57	1.24	23.72	33.1
AUG	.00	5.35	3.32	12.81	1.24	24.09	30.4
SEP	5.19	3.02	3.08	11.86	1.20	22.48	28.8
OCT	20.62	.67	3.32	12.81	1.24	24.09	25.1
NOV	47.38	.13	3.20	12.33	1.20	23.22	22.0
DEC	93.39	.00	3.20	12.33	1.24	23.35	12.6
YEAR	422.02	21.86	38.54	148.46	14.55	280.00	33.1

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 142583. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ INSTALL 3/4 IN. RIGID INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2560E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2075E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9517E+05	-.2096E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1489E+06	-.1291E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1771E+06	-.8413E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2379E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2838E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2474E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2315E+06	-.8299E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1758E+06	-.1224E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1262E+06	-.1731E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2616E+06

BLDG 625 - BATTALION HQ INSTALL 1 IN. RIGID INSULATION

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.850	.850	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.069	.069	.069	.069
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00039	.00039	.00039	.00039
NUMBER OF BN FACTORS (NB	6	6	6	6
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00000	.00000	.00000	.00000
N=3	.00004	.00004	.00004	.00004
N=4	.00015	.00015	.00015	.00015
N=5	.00016	.00016	.00016	.00016
N=6	.00004	.00004	.00004	.00004
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-2.50527	-2.50527	-2.50527	-2.50527
N=3	2.30575	2.30575	2.30575	2.30575
N=4	-.97167	-.97167	-.97167	-.97167
N=5	.19281	.19281	.19281	.19281
N=6	-.01643	-.01643	-.01643	-.01643

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.700000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.967892E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .181E-05 .272E-04 .898E-04 .671E-04 .127E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
  9        1.000      .900      1.000      1.000        70.0        76.0
 10        1.000      .900      1.000      1.000        70.0        76.0
 11         .800      .800       .800       .800        70.0        76.0
 12         .500      .500       .400       .400        70.0        76.0
 13         .800      .800       .800       .800        70.0        76.0
 14        1.000      .900      1.000      1.000        70.0        76.0
 15        1.000      .900      1.000      1.000        70.0        76.0
 16        1.000      .900      1.000      1.000        70.0        76.0
 17        1.000      .800      1.000      1.000        70.0        76.0
 18         .200      .200       .100       .100        70.0        76.0
 19         .100      .000       .000       .000        70.0        76.0
 20         .100      .000       .000       .000        70.0        76.0
 21         .100      .000       .000       .000        70.0        76.0
 22         .100      .000       .000       .000        70.0        76.0
 23         .100      .000       .000       .000        70.0        76.0
 24         .100      .000       .000       .000        70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)      65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)      65.000000
SYSTEM TYPE, (IECN)          2
SUPPLY AIR CFM (SACFM)    9430.000000
ECONOMIZER HIGH TEMP LIMIT F       68.000000
SYSTEM SUPPLY AIR START TIME HR    0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR       24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)      55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)    1.000000E-01
FAN EFFICIENCY (EFAN)    5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)    8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906      1.00      1.00
CHILLER TYPE (ITYPCH)           4
COOLING PLANT RATED OUTPUT BTU (CFLOT)   360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 625 - BATTALION HQ INSTALL 1 IN. RIGID INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-64.83	LOSS		-1.12	-8.92	.00	-5.32	-7.10	-73.86	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.00	.00	.00	.00
	-50.53	LOSS		-.92	-7.57	.00	-4.12	-6.05	-62.61	.00
MAR	.95	GAIN	11.72	.00	.00	.00	.01	.00	.00	.03
	-38.81	LOSS		-.82	-7.03	.00	-3.04	-5.61	-56.86	.00
APR	9.87	GAIN	11.93	.01	.04	.00	.21	.03	.26	1.65
	-14.47	LOSS		-.46	-4.18	.00	-1.32	-3.34	-31.89	.00
MAY	23.47	GAIN	13.07	.03	.14	.00	.82	.11	.87	6.43
	-1.60	LOSS		-.23	-2.50	.00	-.25	-1.92	-18.72	.00
JUN	55.57	GAIN	13.17	.09	.40	.00	1.76	.32	2.63	24.48
	.00	LOSS		-.08	-1.16	.00	.00	-.89	-7.97	.00
JUL	75.94	GAIN	13.38	.18	1.02	.00	2.57	.82	6.91	33.98
	.00	LOSS		-.05	-.72	.00	.00	-.56	-5.32	.00
AUG	71.03	GAIN	11.73	.13	.77	.00	2.13	.60	4.99	33.11
	.00	LOSS		-.05	-.80	.00	.00	-.61	-5.09	.00
SEP	39.69	GAIN	10.12	.05	.39	.00	1.02	.32	2.74	18.27
	-2.46	LOSS		-.21	-1.96	.00	-.30	-1.54	-14.53	.00
OCT	8.32	GAIN	8.62	.00	.06	.00	.11	.05	.38	2.51
	-11.35	LOSS		-.51	-4.03	.00	-1.55	-3.14	-29.61	.00
NOV	1.57	GAIN	6.92	.00	.00	.00	.00	.00	.00	.44
	-29.20	LOSS		-.74	-5.78	.00	-3.07	-4.51	-44.14	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.00	.00	.00	.00
	-63.05	LOSS		-1.11	-8.73	.00	-5.43	-6.87	-70.71	.00
TOT	286.	GAIN	124.	0.	3.	0.	9.	2.	19.	121.
	-276.	LOSS		-6.	-53.	0.	-24.	-42.	-421.	0.

MAX HEATING LOAD= -260248. BTUH ON DEC 18 HOUR 4 AMBIENT TEMP 1.
MAX COOLING LOAD= 283668. BTUH ON JUL 23 HOUR 14 AMBIENT TEMP 68.

ZONE UA BTU/HR-F 812.3

BLDG 625 - BATTALION HQ INSTALL 1 IN. RIGID INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL INTERNAL HEAT GAIN MILLION BTU
JAN	70.	77.		4	17	62.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	71.	76.		26	17	60.	2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	77.		12	15	72.	3.26	12.57	4.22	23.72
			69.	4	6	15.				
APR	73.	77.		27	15	74.	3.14	12.09	4.08	22.85
			70.	1	1	33.				
MAY	75.	78.		15	15	80.	3.32	12.81	4.22	24.09
			70.	11	5	39.				
JUN	76.	78.		12	14	85.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	77.	78.		13	15	91.	3.26	12.57	4.22	23.72
			73.	10	6	60.				
AUG	76.	78.		30	14	87.	3.32	12.81	4.22	24.09
			71.	25	6	51.				
SEP	75.	78.		3	13	89.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73.	78.		5	14	77.	3.32	12.81	4.22	24.09
			70.	28	5	31.				
NOV	71.	77.		8	15	76.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	75.		12	16	59.	3.20	12.33	4.22	23.35
			69.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ INSTALL 1 IN. RIGID INSULATION

	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED		NUMBER OF HOURS WHEN LOADS WERE NOT MET		MAXIMUM LOADS BTU	
MONTH	HEATING	COOLING INCLUDING ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	622	4	0	0	-.2549E+06	.0000
FEB	510	3	0	0	-.2064E+06	.0000
MAR	444	29	0	0	-.2087E+06	.9548E+05
APR	219	136	0	0	-.1286E+06	.1488E+06
MAY	34	299	0	0	-.8396E+05	.1769E+06
JUN	0	422	0	0	.0000	.2374E+06
JUL	0	554	0	0	.0000	.2837E+06
AUG	0	527	0	0	.0000	.2470E+06
SEP	62	334	0	0	-.8273E+05	.2311E+06
OCT	205	125	0	0	-.1220E+06	.1757E+06
NOV	398	43	0	0	-.1721E+06	.1265E+06
DEC	644	0	0	0	-.2602E+06	.0000
YEAR	3138	2476	0	0	-.2602E+06	.2837E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	93.32	.00	3.32	12.81	1.24	24.09	12.6
FEB	73.78	.00	2.95	11.38	1.12	21.47	12.6
MAR	58.66	.08	3.26	12.57	1.24	23.72	20.2
APR	24.22	.82	3.14	12.09	1.20	22.85	23.4
MAY	3.07	1.86	3.32	12.81	1.24	24.09	25.2
JUN	.00	4.15	3.14	12.09	1.20	22.85	29.6
JUL	.00	5.69	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.32	3.32	12.81	1.24	24.09	30.3
SEP	5.18	3.00	3.08	11.86	1.20	22.48	28.8
OCT	20.26	.67	3.32	12.81	1.24	24.09	25.1
NOV	46.88	.14	3.20	12.33	1.20	23.22	22.0
DEC	92.47	.00	3.20	12.33	1.24	23.35	12.6
YEAR	417.84	21.72	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 141778. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ INSTALL 1 IN. RIGID INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2549E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2064E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9548E+05	-.2087E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1488E+06	-.1286E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1769E+06	-.8396E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2374E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2837E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2470E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2311E+06	-.8273E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1757E+06	-.1220E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1265E+06	-.1721E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2602E+06

```
 BLDG 625 - BATTALION HQ  INSTALL 1.5 IN. RIGID INSULATION
 ----------  PROGRAM CONTROL OPTIONS -----------
 COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)            1
 ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)            0
 WEEKEND INTERNAL GAINS FACTOR (WKEND)    5.000000E-01
 LAST CASE FLAG (1=YES, 0=NO)  (LSTCS)            1
 SKY CLEARNESS FACTOR (CLN)         1.000000
 NUMBER OF ZONES (NZ)             1
 WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)            0
 --------- SITE AND BUILDING DATA --------------
 ******REAL WEATHER FROM DISK*******
  FILE NAME SPRNGFMO
 STATION 13995   YEAR 1955
 SITE LATITUDE DEG (AL1)         37.750000
 ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)      1158.000000
 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)        56.000000
 AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN)        20.000000
 SOLAR ABSORBTIVITY OF WALLS (ALPHA)     6.800000E-01
 SOLAR ABSORBTIVITY OF ROOF (ALFRF)     3.500000E-01
 SOLAR REFLECTANCE OF GROUND (RHOG)     2.000000E-01
 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO)        70.000000
 INITIAL TEMPERATURE OF BUILDING MASS (TO)        70.000000
 INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS)     9.000000E-03
 INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW)     0.000000E+00
 VOLUME OF ZONE IN CUBIC FEET (VOLHS)     66521.000000
 FLOOR AREA (SQFT)      5795.000000
 HEATING COIL MAX HEATING RATE BTU/HR (QHMAX)    272020.000000
 COOLING COIL MAX COOLING RATE BTU/HR (QCMAX)   -334850.000000
 COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA)     57950.000000
 CONSTANT INFILTRATION RATE CFM (CFMI)       435.000000
 INFILTRATION PROFILE
  .850       .850       .850       .850       .850       .850       .850       1.00
  1.00       1.00       1.00       1.00       1.00       1.00       1.00       1.00
  1.00       1.00       .850       .850       .850       .850       .850       .850
 A FACTOR IN INFILTRATION EQUATION (CINA)     3.920000E-01
 B FACTOR IN INFILTRATION EQUATION (CINB)     2.165000E-02
 C FACTOR IN INFILTRATION EQUATION (CINC)     8.330000E-03
 BUILDING THERMAL MASS MCP BTU/F (CMCP)     69132.000000
 BASEMENT UA FACTOR BTU/HR-F (BSNF)     0.000000E+00
 SLAB ON GRADE FACTOR BTU/HR-F (SLBF)       288.000000
 PARTITION UA BTU/HR-F (GUA)     0.000000E+00
 DOOR UA BTU/HR-F (DUA)        49.200000
 WINDOW GLASS NUMBER (NG)           30
 DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO)     6.930472E-01
 NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN)     6.930472E-01
 WINDOW SHADING FACTOR (SHD)     6.200000E-01


                                  WALL DATA
 WALL NUMBER                         1          2          3          4
 AZIMUTH ANGLE (AZ)                    .00      90.00     180.00     -90.00
 WALL AREA SQFT (AWLL)              1000.0      849.0     1039.0      482.0
 WINDOW AREA SQFT (AWND)             135.0       90.0      180.0      105.0
 WINDOW HEIGHT FT (WNDH)              10.0       10.0       10.0       10.0
 WINDOW WIDTH FT (WNDW)               13.5        9.0       18.0       10.5
 WIDTH OF OVERHANG (WOH)                .0         .0         .0         .0
 OVERHANG HGT ABV WNDW(HOH)             .0         .0         .0         .0
```

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.055	.055	.055	.055
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00031	.00031	.00031	.00031
NUMBER OF BN FACTORS (NB	6	6	6	6
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00000	.00000	.00000	.00000
N=3	.00003	.00003	.00003	.00003
N=4	.00012	.00012	.00012	.00012
N=5	.00013	.00013	.00013	.00013
N=6	.00003	.00003	.00003	.00003
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-2.50527	-2.50527	-2.50527	-2.50527
N=3	2.30575	2.30575	2.30575	2.30575
N=4	-.97167	-.97167	-.97167	-.97167
N=5	.19281	.19281	.19281	.19281
N=6	-.01643	-.01643	-.01643	-.01643

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.700000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.967892E-04
ROOF B TRANSFER FUNCTIONS (BNR)

.000	.181E-05	.272E-04	.898E-04	.671E-04	.127E-04

ROOF D TRANSFER FUNCTIONS (DNR)

1.00	-1.97	1.36	-.410	.534E-01	-.250E-02

SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

9	1.000	.900	1.000	1.000	70.0	76.0
10	1.000	.900	1.000	1.000	70.0	76.0
11	.800	.800	.800	.800	70.0	76.0
12	.500	.500	.400	.400	70.0	76.0
13	.800	.800	.800	.800	70.0	76.0
14	1.000	.900	1.000	1.000	70.0	76.0
15	1.000	.900	1.000	1.000	70.0	76.0
16	1.000	.900	1.000	1.000	70.0	76.0
17	1.000	.800	1.000	1.000	70.0	76.0
18	.200	.200	.100	.100	70.0	76.0
19	.100	.000	.000	.000	70.0	76.0
20	.100	.000	.000	.000	70.0	76.0
21	.100	.000	.000	.000	70.0	76.0
22	.100	.000	.000	.000	70.0	76.0
23	.100	.000	.000	.000	70.0	76.0
24	.100	.000	.000	.000	70.0	76.0

NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 9430.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.000000
SYSTEM MIXED AIR TEMP(TMXAIR) 55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)

.100	.191	.200	.286	.300	.369	.400	.451
.500	.537	.600	.625	.700	.718	.800	.812
.900	.906	1.00	1.00				

CHILLER TYPE (ITYPCH) 4
COOLING PLANT RATED OUTPUT BTU (CFLOT) 360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)

.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000				

BLDG 625 - BATTALION HQ INSTALL 1.5 IN. RIGID INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-63.81	LOSS		-1.12	-8.93	.00	-4.26	-7.10	-73.89	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.00	.00	.00	.00
	-49.76	LOSS		-.93	-7.58	.00	-3.30	-6.05	-62.66	.00
MAR	.96	GAIN	11.72	.00	.00	.00	.01	.00	.00	.03
	-38.29	LOSS		-.82	-7.04	.00	-2.43	-5.61	-56.92	.00
APR	9.88	GAIN	11.93	.01	.04	.00	.16	.03	.26	1.65
	-14.29	LOSS		-.46	-4.18	.00	-1.06	-3.34	-31.91	.00
MAY	23.36	GAIN	13.07	.03	.14	.00	.66	.11	.87	6.40
	-1.60	LOSS		-.23	-2.49	.00	-.20	-1.92	-18.70	.00
JUN	54.91	GAIN	13.17	.09	.40	.00	1.41	.32	2.63	24.11
	.00	LOSS		-.08	-1.15	.00	.00	-.89	-7.93	.00
JUL	74.94	GAIN	13.38	.18	1.02	.00	2.06	.82	6.92	33.46
	.00	LOSS		-.04	-.72	.00	.00	-.56	-5.30	.00
AUG	70.06	GAIN	11.73	.13	.77	.00	1.70	.60	4.99	32.53
	.00	LOSS		-.05	-.79	.00	.00	-.61	-5.06	.00
SEP	39.42	GAIN	10.12	.05	.39	.00	.82	.32	2.74	18.15
	-2.44	LOSS		-.21	-1.96	.00	-.24	-1.54	-14.52	.00
OCT	8.33	GAIN	8.62	.00	.06	.00	.09	.05	.38	2.51
	-11.15	LOSS		-.51	-4.04	.00	-1.24	-3.14	-29.67	.00
NOV	1.60	GAIN	6.92	.00	.00	.00	.00	.00	.00	.44
	-28.69	LOSS		-.74	-5.79	.00	-2.46	-4.51	-44.21	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.00	.00	.00	.00
	-61.99	LOSS		-1.11	-8.73	.00	-4.35	-6.87	-70.73	.00
TOT	283.	GAIN	124.	0.	3.	0.	7.	2.	19.	119.
	-272.	LOSS		-6.	-53.	0.	-20.	-42.	-421.	0.

MAX HEATING LOAD= -258280. BTUH ON DEC 18 HOUR 4 AMBIENT TEMP 1.
MAX COOLING LOAD= 283492. BTUH ON JUL 23 HOUR 14 AMBIENT TEMP 68.

ZONE UA BTU/HR-F 765.8

BLDG 625 - BATTALION HQ INSTALL 1.5 IN. RIGID INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	77.		4	17	62.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	71.	76.		26	17	60.	2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	77.		12	15	72.	3.26	12.57	4.22	23.72
			69.	3	6	15.				
APR	73.	77.		24	15	81.	3.14	12.09	4.08	22.85
			70.	14	6	29.				
MAY	75.	78.		15	15	80.	3.32	12.81	4.22	24.09
			70.	11	5	39.				
JUN	76.	78.		12	14	85.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	77.	78.		13	15	91.	3.26	12.57	4.22	23.72
			73.	10	6	60.				
AUG	76.	78.		30	14	87.	3.32	12.81	4.22	24.09
			71.	25	6	51.				
SEP	75.	78.		3	13	89.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73.	78.		5	14	77.	3.32	12.81	4.22	24.09
			70.	28	5	31.				
NOV	71.	77.		8	15	76.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	75.		12	16	59.	3.20	12.33	4.22	23.35
			69.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ INSTALL 1.5 IN. RIGID INSULATION

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	619	4	0	0	-.2535E+06	.0000
FEB	505	3	0	0	-.2049E+06	.0000
MAR	441	29	0	0	-.2074E+06	.9593E+05
APR	216	136	0	0	-.1278E+06	.1487E+06
MAY	35	297	0	0	-.8372E+05	.1765E+06
JUN	0	415	0	0	.0000	.2368E+06
JUL	0	545	0	0	.0000	.2835E+06
AUG	0	516	0	0	.0000	.2465E+06
SEP	62	331	0	0	-.8234E+05	.2304E+06
OCT	205	125	0	0	-.1213E+06	.1756E+06
NOV	397	43	0	0	-.1706E+06	.1269E+06
DEC	640	0	0	0	-.2583E+06	.0000
YEAR	3120	2444	0	0	-.2583E+06	.2835E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	92.11	.00	3.32	12.81	1.24	24.09	12.6
FEB	72.76	.00	2.95	11.38	1.12	21.47	12.6
MAR	57.99	.09	3.26	12.57	1.24	23.72	20.2
APR	23.86	.82	3.14	12.09	1.20	22.85	23.4
MAY	3.13	1.85	3.32	12.81	1.24	24.09	25.2
JUN	.00	4.09	3.14	12.09	1.20	22.85	29.6
JUL	.00	5.61	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.24	3.32	12.81	1.24	24.09	30.3
SEP	5.17	2.98	3.08	11.86	1.20	22.48	28.8
OCT	20.09	.67	3.32	12.81	1.24	24.09	25.1
NOV	46.38	.14	3.20	12.33	1.20	23.22	22.0
DEC	91.18	.00	3.20	12.33	1.24	23.35	12.6
YEAR	412.68	21.49	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 140749. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ INSTALL 1.5 IN. RIGID INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2535E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2049E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9593E+05	-.2074E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1487E+06	-.1278E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1765E+06	-.8372E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2368E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2835E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2465E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2304E+06	-.8234E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1756E+06	-.1213E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1269E+06	-.1706E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2583E+06

BLDG 625 - BATTALION HQ INSTALL 2 IN. RIGID INSULATION
---------- PROGRAM CONTROL OPTIONS ----------
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0
--------- SITE AND BUILDING DATA ----------
******REAL WEATHER FROM DISK*******
FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.850	.850	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.046	.046	.046	.046
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00127	.00127	.00127	.00127
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00011	.00011	.00011	.00011
N=3	.00062	.00062	.00062	.00062
N=4	.00047	.00047	.00047	.00047
N=5	.00006	.00006	.00006	.00006
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	-.16643	-.16643	-.16643	-.16643
N=5	.00728	.00728	.00728	.00728
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.700000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.967892E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .181E-05 .272E-04 .898E-04 .671E-04 .127E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
 9        1.000      .900      1.000      1.000        70.0       76.0
10        1.000      .900      1.000      1.000        70.0       76.0
11         .800      .800       .800       .800        70.0       76.0
12         .500      .500       .400       .400        70.0       76.0
13         .800      .800       .800       .800        70.0       76.0
14        1.000      .900      1.000      1.000        70.0       76.0
15        1.000      .900      1.000      1.000        70.0       76.0
16        1.000      .900      1.000      1.000        70.0       76.0
17        1.000      .800      1.000      1.000        70.0       76.0
18         .200      .200       .100       .100        70.0       76.0
19         .100      .000       .000       .000        70.0       76.0
20         .100      .000       .000       .000        70.0       76.0
21         .100      .000       .000       .000        70.0       76.0
22         .100      .000       .000       .000        70.0       76.0
23         .100      .000       .000       .000        70.0       76.0
24         .100      .000       .000       .000        70.0       76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)            2
SUPPLY AIR CFM (SACFM)     9430.000000
ECONOMIZER HIGH TEMP LIMIT F        68.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906      1.00      1.00
CHILLER TYPE (ITYPCH)            4
COOLING PLANT RATED OUTPUT BTU (CFLOT)   360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 625 - BATTALION HQ INSTALL 2 IN. RIGID INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-62.85	LOSS		-1.12	-8.93	.00	-3.24	-7.11	-73.94	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.00	.00	.00	.00
	-48.99	LOSS		-.93	-7.58	.00	-2.45	-6.06	-62.72	.00
MAR	.98	GAIN	11.72	.00	.00	.00	.03	.00	.00	.03
	-37.80	LOSS		-.82	-7.05	.00	-1.83	-5.62	-57.01	.00
APR	9.98	GAIN	11.93	.01	.04	.00	.23	.03	.26	1.65
	-14.11	LOSS		-.46	-4.19	.00	-.78	-3.34	-31.96	.00
MAY	23.33	GAIN	13.07	.03	.14	.00	.63	.11	.87	6.37
	-1.60	LOSS		-.23	-2.49	.00	-.17	-1.92	-18.70	.00
JUN	54.09	GAIN	13.17	.09	.40	.00	1.20	.32	2.63	23.47
	.00	LOSS		-.08	-1.15	.00	.00	-.88	-7.90	.00
JUL	74.36	GAIN	13.38	.18	1.02	.00	1.70	.82	6.92	33.20
	.00	LOSS		-.04	-.71	.00	-.01	-.55	-5.27	.00
AUG	69.47	GAIN	11.73	.13	.77	.00	1.42	.60	4.99	32.20
	.00	LOSS		-.05	-.79	.00	.00	-.61	-5.04	.00
SEP	39.15	GAIN	10.12	.05	.39	.00	.72	.32	2.74	17.95
	-2.44	LOSS		-.21	-1.96	.00	-.20	-1.54	-14.53	.00
OCT	8.43	GAIN	8.62	.00	.06	.00	.12	.05	.38	2.54
	-10.97	LOSS		-.51	-4.04	.00	-.93	-3.15	-29.75	.00
NOV	1.65	GAIN	6.92	.00	.00	.00	.01	.00	.00	.44
	-28.23	LOSS		-.74	-5.80	.00	-1.84	-4.52	-44.30	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.00	.00	.00	.00
	-60.96	LOSS		-1.11	-8.73	.00	-3.27	-6.87	-70.76	.00
TOT	281.	GAIN	124.	0.	3.	0.	6.	2.	19.	118.
	-268.	LOSS		-6.	-53.	0.	-15.	-42.	-422.	0.

MAX HEATING LOAD= -257749. BTUH ON DEC 18 HOUR 4 AMBIENT TEMP 1.
MAX COOLING LOAD= 283156. BTUH ON JUL 23 HOUR 14 AMBIENT TEMP 68.

ZONE UA BTU/HR-F 735.2

BLDG 625 - BATTALION HQ INSTALL 2 IN. RIGID INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	77.		4	16	63.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	71.	76.		26	17	60.	2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	77.		12	15	72.	3.26	12.57	4.22	23.72
			69.	3	6	15.				
APR	73.	78.		24	15	81.	3.14	12.09	4.08	22.85
			70.	14	6	29.				
MAY	75.	78.		15	15	80.	3.32	12.81	4.22	24.09
			70.	11	5	39.				
JUN	76.	78.		12	14	85.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	76.	78.		13	15	91.	3.26	12.57	4.22	23.72
			72.	10	6	60.				
AUG	76.	78.		30	14	87.	3.32	12.81	4.22	24.09
			71.	25	6	51.				
SEP	75.	78.		11	14	85.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73.	78.		5	14	77.	3.32	12.81	4.22	24.09
			70.	28	5	31.				
NOV	72.	77.		8	15	76.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	75.		12	16	59.	3.20	12.33	4.22	23.35
			69.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ INSTALL 2 IN. RIGID INSULATION

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	618	5	0	0	-.2531E+06	.0000
FEB	497	4	0	0	-.2040E+06	.0000
MAR	437	30	0	0	-.2071E+06	.9744E+05
APR	214	137	0	0	-.1274E+06	.1489E+06
MAY	34	295	0	0	-.8396E+05	.1769E+06
JUN	0	408	0	0	.0000	.2366E+06
JUL	0	541	0	0	.0000	.2832E+06
AUG	0	510	0	0	.0000	.2463E+06
SEP	61	328	0	0	-.8260E+05	.2295E+06
OCT	203	125	0	0	-.1210E+06	.1756E+06
NOV	392	45	0	0	-.1700E+06	.1281E+06
DEC	636	0	0	0	-.2577E+06	.0000
YEAR	3092	2428	0	0	-.2577E+06	.2832E+06

SYSTEM TOTALS

MONTH	ENERGY CONSUMPTION HEATING MILLION BTU	COOLING THOUSAND KWH	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FANS THOUSAND KWH	TOTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	91.09	.00	3.32	12.81	1.24	24.09	12.6
FEB	71.58	.00	2.95	11.38	1.12	21.47	12.6
MAR	57.31	.09	3.26	12.57	1.24	23.72	20.3
APR	23.57	.83	3.14	12.09	1.20	22.85	23.4
MAY	3.06	1.84	3.32	12.81	1.24	24.09	25.2
JUN	.00	4.03	3.14	12.09	1.20	22.85	29.5
JUL	.00	5.57	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.19	3.32	12.81	1.24	24.09	30.3
SEP	5.11	2.96	3.08	11.86	1.20	22.48	28.8
OCT	19.84	.68	3.32	12.81	1.24	24.09	25.1
NOV	45.70	.14	3.20	12.33	1.20	23.22	22.1
DEC	89.96	.00	3.20	12.33	1.24	23.35	12.6
YEAR	407.21	21.32	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 139709. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ INSTALL 2 IN. RIGID INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2531E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2040E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9744E+05	-.2071E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1489E+06	-.1274E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1769E+06	-.8396E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2366E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2832E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2463E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2295E+06	-.8260E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1756E+06	-.1210E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1281E+06	-.1700E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2577E+06

BLDG 625 - BATTALION HQ INSTALL 2.5 IN. RIGID INSULATION
---------- PROGRAM CONTROL OPTIONS ----------
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0
--------- SITE AND BUILDING DATA ----------
******REAL WEATHER FROM DISK*******
FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.850	.850	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.040	.040	.040	.040
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00022	.00022	.00022	.00022
NUMBER OF BN FACTORS (NB	6	6	6	6
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00000	.00000	.00000	.00000
N=3	.00002	.00002	.00002	.00002
N=4	.00009	.00009	.00009	.00009
N=5	.00009	.00009	.00009	.00009
N=6	.00002	.00002	.00002	.00002
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-2.50527	-2.50527	-2.50527	-2.50527
N=3	2.30575	2.30575	2.30575	2.30575
N=4	-.97167	-.97167	-.97167	-.97167
N=5	.19281	.19281	.19281	.19281
N=6	-.01643	-.01643	-.01643	-.01643

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.700000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.967892E-04
ROOF B TRANSFER FUNCTIONS (BNR)

.000	.181E-05	.272E-04	.898E-04	.671E-04	.127E-04

ROOF D TRANSFER FUNCTIONS (DNR)

1.00	-1.97	1.36	-.410	.534E-01	-.250E-02

SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
  9        1.000      .900      1.000     1.000        70.0        76.0
 10        1.000      .900      1.000     1.000        70.0        76.0
 11         .800      .800       .800      .800        70.0        76.0
 12         .500      .500       .400      .400        70.0        76.0
 13         .800      .800       .800      .800        70.0        76.0
 14        1.000      .900      1.000     1.000        70.0        76.0
 15        1.000      .900      1.000     1.000        70.0        76.0
 16        1.000      .900      1.000     1.000        70.0        76.0
 17        1.000      .800      1.000     1.000        70.0        76.0
 18         .200      .200       .100      .100        70.0        76.0
 19         .100      .000       .000      .000        70.0        76.0
 20         .100      .000       .000      .000        70.0        76.0
 21         .100      .000       .000      .000        70.0        76.0
 22         .100      .000       .000      .000        70.0        76.0
 23         .100      .000       .000      .000        70.0        76.0
 24         .100      .000       .000      .000        70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)            2
SUPPLY AIR CFM (SACFM)     9430.000000
ECONOMIZER HIGH TEMP LIMIT F        68.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)             4
COOLING PLANT RATED OUTPUT BTU (CFLOT)   360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 625 - BATTALION HQ INSTALL 2.5 IN. RIGID INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-62.66	LOSS		-1.12	-8.93	.00	-3.05	-7.11	-73.94	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.00	.00	.00	.00
	-48.90	LOSS		-.93	-7.58	.00	-2.36	-6.06	-62.72	.00
MAR	.98	GAIN	11.72	.00	.00	.00	.00	.00	.00	.03
	-37.70	LOSS		-.82	-7.04	.00	-1.74	-5.61	-56.99	.00
APR	9.90	GAIN	11.93	.01	.04	.00	.12	.03	.26	1.65
	-14.09	LOSS		-.46	-4.19	.00	-.76	-3.34	-31.93	.00
MAY	23.21	GAIN	13.07	.03	.14	.00	.47	.11	.87	6.36
	-1.59	LOSS		-.23	-2.49	.00	-.14	-1.92	-18.68	.00
JUN	53.88	GAIN	13.17	.09	.40	.00	1.01	.32	2.63	23.41
	.00	LOSS		-.08	-1.15	.00	.00	-.88	-7.87	.00
JUL	73.94	GAIN	13.38	.18	1.02	.00	1.48	.82	6.92	33.01
	.00	LOSS		-.04	-.71	.00	.00	-.55	-5.27	.00
AUG	69.11	GAIN	11.73	.13	.77	.00	1.22	.60	4.99	32.04
	.00	LOSS		-.05	-.79	.00	.00	-.61	-5.03	.00
SEP	38.99	GAIN	10.12	.05	.39	.00	.59	.32	2.74	17.89
	-2.42	LOSS		-.21	-1.96	.00	-.17	-1.54	-14.52	.00
OCT	8.39	GAIN	8.62	.00	.06	.00	.06	.05	.38	2.54
	-10.92	LOSS		-.51	-4.04	.00	-.89	-3.15	-29.74	.00
NOV	1.63	GAIN	6.92	.00	.00	.00	.00	.00	.00	.44
	-28.11	LOSS		-.74	-5.79	.00	-1.76	-4.52	-44.28	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.00	.00	.00	.00
	-60.79	LOSS		-1.11	-8.73	.00	-3.11	-6.87	-70.76	.00
TOT	280.	GAIN	124.	0.	3.	0.	5.	2.	19.	117.
	-267.	LOSS		-6.	-53.	0.	-14.	-42.	-422.	0.

MAX HEATING LOAD= -256043. BTUH ON DEC 18 HOUR 4 AMBIENT TEMP 1.
MAX COOLING LOAD= 283291. BTUH ON JUL 23 HOUR 14 AMBIENT TEMP 68.

ZONE UA BTU/HR-F 712.9

BLDG 625 - BATTALION HQ INSTALL 2.5 IN. RIGID INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	77.		4	16	63.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	71.	76.		26	17	60.	2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	77.		12	15	72.	3.26	12.57	4.22	23.72
			69.	3	6	15.				
APR	73.	77.		24	15	81.	3.14	12.09	4.08	22.85
			70.	14	6	29.				
MAY	75.	78.		15	15	80.	3.32	12.81	4.22	24.09
			70.	11	5	39.				
JUN	76.	78.		12	14	85.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	76.	78.		13	15	91.	3.26	12.57	4.22	23.72
			72.	10	6	60.				
AUG	76.	78.		30	14	87.	3.32	12.81	4.22	24.09
			71.	25	6	51.				
SEP	75.	78.		3	13	89.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73.	78.		5	14	77.	3.32	12.81	4.22	24.09
			70.	28	5	31.				
NOV	72.	77.		8	15	76.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	75.		12	16	59.	3.20	12.33	4.22	23.35
			69.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ INSTALL 2.5 IN. RIGID INSULATION

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	618	5	0	0	-.2518E+06	.0000
FEB	499	4	0	0	-.2031E+06	.0000
MAR	439	30	0	0	-.2059E+06	.9644E+05
APR	215	136	0	0	-.1269E+06	.1485E+06
MAY	35	295	0	0	-.8344E+05	.1761E+06
JUN	0	406	0	0	.0000	.2361E+06
JUL	0	537	0	0	.0000	.2833E+06
AUG	0	507	0	0	.0000	.2459E+06
SEP	62	327	0	0	-.8190E+05	.2297E+06
OCT	203	125	0	0	-.1205E+06	.1754E+06
NOV	391	44	0	0	-.1690E+06	.1273E+06
DEC	635	0	0	0	-.2560E+06	.0000
YEAR	3097	2416	0	0	-.2560E+06	.2833E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	90.89	.00	3.32	12.81	1.24	24.09	12.6
FEB	71.59	.00	2.95	11.38	1.12	21.47	12.6
MAR	57.31	.09	3.26	12.57	1.24	23.72	20.3
APR	23.60	.82	3.14	12.09	1.20	22.85	23.3
MAY	3.12	1.84	3.32	12.81	1.24	24.09	25.1
JUN	.00	4.01	3.14	12.09	1.20	22.85	29.5
JUL	.00	5.53	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.17	3.32	12.81	1.24	24.09	30.2
SEP	5.16	2.94	3.08	11.86	1.20	22.48	28.7
OCT	19.80	.67	3.32	12.81	1.24	24.09	25.1
NOV	45.53	.14	3.20	12.33	1.20	23.22	22.1
DEC	89.72	.00	3.20	12.33	1.24	23.35	12.6
YEAR	406.71	21.22	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 139560. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ INSTALL 2.5 IN. RIGID INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	-	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2518E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2031E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9644E+05	-.2059E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1485E+06	-.1269E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1761E+06	-.8344E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2361E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2833E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2459E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2297E+06	-.8190E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1754E+06	-.1205E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1273E+06	-.1690E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2560E+06

BLDG 625 - BATTALION HQ INSTALL 3 IN. RIGID INSULATION

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.850	.850	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) . 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.035	.035	.035	.035
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00020	.00020	.00020	.00020
NUMBER OF BN FACTORS (NB	6	6	6	6
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00000	.00000	.00000	.00000
N=3	.00002	.00002	.00002	.00002
N=4	.00008	.00008	.00008	.00008
N=5	.00008	.00008	.00008	.00008
N=6	.00002	.00002	.00002	.00002
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-2.50527	-2.50527	-2.50527	-2.50527
N=3	2.30575	2.30575	2.30575	2.30575
N=4	-.97167	-.97167	-.97167	-.97167
N=5	.19281	.19281	.19281	.19281
N=6	-.01643	-.01643	-.01643	-.01643

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.700000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.967892E-04
ROOF B TRANSFER FUNCTIONS (BNR)

.000	.181E-05	.272E-04	.898E-04	.671E-04	.127E-04

ROOF D TRANSFER FUNCTIONS (DNR)

1.00	-1.97	1.36	-.410	.534E-01	-.250E-02

SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
   9        1.000      .900      1.000     1.000        70.0        76.0
  10        1.000      .900      1.000     1.000        70.0        76.0
  11         .800      .800       .800      .800        70.0        76.0
  12         .500      .500       .400      .400        70.0        76.0
  13         .800      .800       .800      .800        70.0        76.0
  14        1.000      .900      1.000     1.000        70.0        76.0
  15        1.000      .900      1.000     1.000        70.0        76.0
  16        1.000      .900      1.000     1.000        70.0        76.0
  17        1.000      .800      1.000     1.000        70.0        76.0
  18         .200      .200       .100      .100        70.0        76.0
  19         .100      .000       .000      .000        70.0        76.0
  20         .100      .000       .000      .000        70.0        76.0
  21         .100      .000       .000      .000        70.0        76.0
  22         .100      .000       .000      .000        70.0        76.0
  23         .100      .000       .000      .000        70.0        76.0
  24         .100      .000       .000      .000        70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)     9430.000000
ECONOMIZER HIGH TEMP LIMIT F        68.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)            4
COOLING PLANT RATED OUTPUT BTU (CFLOT)   360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 625 - BATTALION HQ INSTALL 3 IN. RIGID INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-62.30	LOSS		-1.12	-8.93	.00	-2.67	-7.11	-73.95	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.00	.00	.00	.00
	-48.63	LOSS		-.93	-7.59	.00	-2.07	-6.06	-62.74	.00
MAR	.98	GAIN	11.72	.00	.00	.00	.00	.00	.00	.03
	-37.52	LOSS		-.82	-7.05	.00	-1.53	-5.62	-57.02	.00
APR	9.91	GAIN	11.93	.01	.04	.00	.10	.03	.26	1.65
	-14.02	LOSS		-.46	-4.19	.00	-.67	-3.34	-31.94	.00
MAY	23.10	GAIN	13.07	.03	.14	.00	.41	.11	.87	6.28
	-1.59	LOSS		-.23	-2.49	.00	-.12	-1.92	-18.67	.00
JUN	53.71	GAIN	13.17	.09	.40	.00	.89	.32	2.63	23.35
	.00	LOSS		-.08	-1.15	.00	.00	-.88	-7.86	.00
JUL	73.57	GAIN	13.38	.18	1.02	.00	1.29	.82	6.92	32.81
	.00	LOSS		-.04	-.71	.00	.00	-.55	-5.26	.00
AUG	68.75	GAIN	11.73	.13	.77	.00	1.07	.60	4.99	31.81
	.00	LOSS		-.05	-.79	.00	.00	-.61	-5.02	.00
SEP	38.89	GAIN	10.12	.05	.39	.00	.51	.32	2.74	17.85
	-2.42	LOSS		-.21	-1.96	.00	-.15	-1.54	-14.51	.00
OCT	8.39	GAIN	8.62	.00	.06	.00	.06	.05	.38	2.54
	-10.85	LOSS		-.51	-4.04	.00	-.78	-3.15	-29.76	.00
NOV	1.64	GAIN	6.92	.00	.00	.00	.00	.00	.00	.44
	-27.93	LOSS		-.74	-5.80	.00	-1.54	-4.52	-44.30	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.00	.00	.00	.00
	-60.42	LOSS		-1.11	-8.73	.00	-2.73	-6.87	-70.77	.00
TOT	279.	GAIN	124.	0.	3.	0.	4.	2.	19.	117.
	-266.	LOSS		-6.	-53.	0.	-12.	-42.	-422.	0.

MAX HEATING LOAD= -255343. BTUH ON DEC 18 HOUR 4 AMBIENT TEMP 1.
MAX COOLING LOAD= 283230. BTUH ON JUL 23 HOUR 14 AMBIENT TEMP 68.

ZONE UA BTU/HR-F 696.4

BLDG 625 - BATTALION HQ INSTALL 3 IN. RIGID INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	77.		4	16	63.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	71.	77.		26	17	60.	2.95	11.38	3.81	21.47
			69.	2	5	14.				
MAR	71.	77.		12	15	72.	3.26	12.57	4.22	23.72
			69.	3	6	15.				
APR	73.	77.		24	15	81.	3.14	12.09	4.08	22.85
			70.	14	6	29.				
MAY	75.	78.		15	15	80.	3.32	12.81	4.22	24.09
			70.	11	5	39.				
JUN	76.	78.		12	14	85.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	76.	78.		13	15	91.	3.26	12.57	4.22	23.72
			72.	10	6	60.				
AUG	76.	78.		30	14	87.	3.32	12.81	4.22	24.09
			71.	25	6	51.				
SEP	75.	78.		3	13	89.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73.	78.		5	14	77.	3.32	12.81	4.22	24.09
			70.	28	5	31.				
NOV	72.	77.		8	15	76.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	75.		12	16	59.	3.20	12.33	4.22	23.35
			69.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ INSTALL 3 IN. RIGID INSULATION

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	618	5	0	0	-.2513E+06	.0000
FEB	498	4	0	0	-.2026E+06	.0000
MAR	438	30	0	0	-.2055E+06	.9660E+05
APR	214	136	0	0	-.1266E+06	.1484E+06
MAY	35	292	0	0	-.8335E+05	.1760E+06
JUN	0	405	0	0	.0000	.2359E+06
JUL	0	534	0	0	.0000	.2832E+06
AUG	0	502	0	0	.0000	.2457E+06
SEP	62	326	0	0	-.8177E+05	.2295E+06
OCT	202	125	0	0	-.1202E+06	.1754E+06
NOV	388	44	0	0	-.1685E+06	.1275E+06
DEC	635	0	0	0	-.2553E+06	.0000
YEAR	3090	2403	0	0	-.2553E+06	.2832E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	90.53	.00	3.32	12.81	1.24	24.09	12.6
FEB	71.27	.00	2.95	11.38	1.12	21.47	12.6
MAR	57.08	.09	3.26	12.57	1.24	23.72	20.3
APR	23.48	.82	3.14	12.09	1.20	22.85	23.3
MAY	3.11	1.83	3.32	12.81	1.24	24.09	25.1
JUN	.00	4.00	3.14	12.09	1.20	22.85	29.5
JUL	.00	5.51	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.14	3.32	12.81	1.24	24.09	30.2
SEP	5.15	2.94	3.08	11.86	1.20	22.48	28.7
OCT	19.67	.67	3.32	12.81	1.24	24.09	25.1
NOV	45.19	.14	3.20	12.33	1.20	23.22	22.1
DEC	89.36	.00	3.20	12.33	1.24	23.35	12.6
YEAR	404.85	21.13	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 139188. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ INSTALL 3 IN. RIGID INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	-	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2513E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2026E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9660E+05	-.2055E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1484E+06	-.1266E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1760E+06	-.8335E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2359E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2832E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2457E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2295E+06	-.8177E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1754E+06	-.1202E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1275E+06	-.1685E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2553E+06

Fiberglass Batt Insulation on Roofs

BLDG 625 - BATTALION HQ BASERUN FOR ROOF INSULATION

---------- PROGRAM CONTROL OPTIONS -----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1

ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0

WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01

LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1

SKY CLEARNESS FACTOR (CLN) 1.000000

NUMBER OF ZONES (NZ) 1

WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1

WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA --------------

******REAL WEATHER FROM DISK*******

FILE NAME SPRNGFMO

STATION 13995 YEAR 1955

SITE LATITUDE DEG (AL1) 37.750000

ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000

MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000

AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000

SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01

SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01

SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01

INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000

INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000

INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03

INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00

VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000

FLOOR AREA (SQFT) 5795.000000

HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000

COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000

COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000

CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000

INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.850	.850	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01

B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02

C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03

BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000

BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00

SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000

PARTITION UA BTU/HR-F (GUA) 0.000000E+00

DOOR UA BTU/HR-F (DUA) 49.200000

WINDOW GLASS NUMBER (NG) 30

DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01

NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01

WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.243	.244	.244
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01837	.01822	.01829	.01829
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00003	.00003	.00003	.00003
N=2	.00283	.00280	.00281	.00281
N=3	.01017	.01008	.01012	.01012
N=4	.00498	.00494	.00496	.00496
N=5	.00037	.00036	.00036	.00036
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	-.07415	-.07415	-.07415	-.07415
N=5	.00212	.00212	.00212	.00212
N=6	********	********	********	********

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 1.290000E-01
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 2.265913E-02
ROOF B TRANSFER FUNCTIONS (BNR)
.337E-03 .920E-02 .116E-01 .157E-02 .112E+04 .112E+04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.00 .184 -.460E-02 999. 999.
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
  9        1.000      .900     1.000     1.000        70.0        76.0
 10        1.000      .900     1.000     1.000        70.0        76.0
 11         .800      .800      .800      .800        70.0        76.0
 12         .500      .500      .400      .400        70.0        76.0
 13         .800      .800      .800      .800        70.0        76.0
 14        1.000      .900     1.000     1.000        70.0        76.0
 15        1.000      .900     1.000     1.000        70.0        76.0
 16        1.000      .900     1.000     1.000        70.0        76.0
 17        1.000      .800     1.000     1.000        70.0        76.0
 18         .200      .200      .100      .100        70.0        76.0
 19         .100      .000      .000      .000        70.0        76.0
 20         .100      .000      .000      .000        70.0        76.0
 21         .100      .000      .000      .000        70.0        76.0
 22         .100      .000      .000      .000        70.0        76.0
 23         .100      .000      .000      .000        70.0        76.0
 24         .100      .000      .000      .000        70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)     9430.000000
ECONOMIZER HIGH TEMP LIMIT F        68.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)            4
COOLING PLANT RATED OUTPUT BTU (CFLOT)   360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 625 - BATTALION HQ BASERUN FOR ROOF INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-96.40	LOSS		-21.70	-8.86	.00	-17.11	-7.05	-73.20	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.07	.00	.00	.00
	-75.28	LOSS		-17.90	-7.50	.00	-12.79	-5.98	-61.94	.00
MAR	.79	GAIN	11.72	.06	.00	.00	.84	.00	.00	.00
	-59.19	LOSS		-15.99	-6.96	.00	-10.23	-5.54	-56.03	.00
APR	9.40	GAIN	11.93	.54	.04	.00	2.51	.03	.29	1.55
	-23.38	LOSS		-9.31	-4.12	.00	-4.98	-3.29	-31.56	.00
MAY	23.71	GAIN	13.07	1.47	.14	.00	4.64	.11	.90	5.87
	-3.39	LOSS		-5.51	-2.43	.00	-2.02	-1.87	-18.09	.00
JUN	59.34	GAIN	13.17	2.65	.41	.00	6.97	.32	2.64	24.33
	.00	LOSS		-2.87	-1.15	.00	-.56	-.88	-8.52	.00
JUL	85.39	GAIN	13.38	4.20	1.02	.00	9.28	.81	6.90	34.79
	.00	LOSS		-1.97	-.71	.00	-.27	-.55	-5.21	.00
AUG	78.61	GAIN	11.73	3.27	.77	.00	7.79	.60	4.99	34.36
	-.03	LOSS		-2.18	-.79	.00	-.33	-.60	-5.15	.00
SEP	41.92	GAIN	10.12	1.41	.39	.00	4.57	.32	2.77	18.65
	-4.89	LOSS		-4.88	-1.91	.00	-1.85	-1.50	-13.99	.00
OCT	7.44	GAIN	8.62	.21	.06	.00	1.41	.05	.42	2.24
	-20.86	LOSS		-10.04	-3.90	.00	-5.42	-3.03	-28.12	.00
NOV	1.08	GAIN	6.92	.00	.00	.00	.34	.00	.00	.31
	-47.67	LOSS		-14.41	-5.68	.00	-9.81	-4.43	-43.08	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.01	.00	.00	.00
	-94.55	LOSS		-21.56	-8.67	.00	-17.18	-6.82	-70.14	.00
TOT	308.	GAIN	124.	14.	3.	0.	38.	2.	19.	122.
	-426.	LOSS		-128.	-53.	0.	-83.	-42.	-415.	0.

MAX HEATING LOAD= -272020. BTUH ON DEC 18 HOUR 12 AMBIENT TEMP 15.
MAX COOLING LOAD= 296922. BTUH ON JUL 26 HOUR 17 AMBIENT TEMP 93.

ZONE UA BTU/HR-F 1935.4

BLDG 625 - BATTALION HQ BASERUN FOR ROOF INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL INTERNAL HEAT GAIN MILLION BTU
JAN	70.	76.		4	17	62.	3.32	12.81	4.22	24.09
			66.	27	7	4.				
FEB	70.	74.		26	17	60.	2.95	11.38	3.81	21.47
			68.	2	6	14.				
MAR	71.	77.		12	16	69.	3.26	12.57	4.22	23.72
			68.	4	6	15.				
APR	73.	78.		30	16	84.	3.14	12.09	4.08	22.85
			69.	9	6	30.				
MAY	75.	78.		29	16	85.	3.32	12.81	4.22	24.09
			69.	11	6	39.				
JUN	76.	78.		27	15	89.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	77.	78.		26	16	94.	3.26	12.57	4.22	23.72
			72.	10	6	60.				
AUG	76.	78.		29	16	95.	3.32	12.81	4.22	24.09
			70.	25	7	55.				
SEP	75.	78.		11	15	86.	3.08	11.86	4.08	22.48
			69.	15	6	39.				
OCT	72.	78.		5	15	73.	3.32	12.81	4.22	24.09
			69.	28	6	33.				
NOV	71.	77.		8	16	75.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	69.	73.		12	16	59.	3.20	12.33	4.22	23.35
			62.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ BASERUN FOR ROOF INSULATION

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	686	0	24	0	-.2720E+06	.0000
FEB	584	0	0	0	-.2719E+06	.0000
MAR	541	21	1	0	-.2720E+06	.1062E+06
APR	294	132	0	0	-.1764E+06	.1541E+06
MAY	63	291	0	0	-.1232E+06	.2042E+06
JUN	0	458	0	0	.0000	.2682E+06
JUL	0	582	0	0	.0000	.2969E+06
AUG	2	557	0	0	-.2087E+05	.2646E+06
SEP	86	336	0	0	-.1182E+06	.2529E+06
OCT	298	104	0	0	-.1637E+06	.1881E+06
NOV	494	25	0	0	-.2367E+06	.1243E+06
DEC	716	0	18	0	-.2720E+06	.0000
YEAR	3764	2506	43	0	-.2720E+06	.2969E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
MONTH	HEATING MILLION BTU	COOLING THOUSAND KWH	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FANS THOUSAND KWH	HEAT GAIN MILLION BTU	ELECTRIC DEMAND KW
JAN	130.31	.00	3.32	12.81	1.24	24.09	12.6
FEB	103.79	.00	2.95	11.38	1.12	21.47	12.6
MAR	84.63	.07	3.26	12.57	1.24	23.72	20.8
APR	36.58	.77	3.14	12.09	1.20	22.85	23.7
MAY	6.25	1.84	3.32	12.81	1.24	24.09	27.1
JUN	.00	4.40	3.14	12.09	1.20	22.85	31.9
JUL	.00	6.35	3.26	12.57	1.24	23.72	33.9
AUG	.13	5.85	3.32	12.81	1.24	24.09	31.7
SEP	8.68	3.15	3.08	11.86	1.20	22.48	30.5
OCT	34.17	.60	3.32	12.81	1.24	24.09	26.0
NOV	70.26	.09	3.20	12.33	1.20	23.22	21.9
DEC	129.57	.00	3.20	12.33	1.24	23.35	12.6
YEAR	604.38	23.11	38.54	148.46	14.55	280.00	33.9

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 174785. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ BASERUN FOR ROOF INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	-	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2720E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2719E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1062E+06	-.2720E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1541E+06	-.1764E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.2042E+06	-.1232E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2682E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2969E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2646E+06	-.2087E+05
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2529E+06	-.1182E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1881E+06	-.1637E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1243E+06	-.2367E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2720E+06

BLDG 625 - BATTALION HQ INSTALL 1 IN. FB BATT INSUL. ON ROOF

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.850	.850	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.243	.244	.244
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01837	.01822	.01829	.01829
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00003	.00003	.00003	.00003
N=2	.00283	.00280	.00281	.00281
N=3	.01017	.01008	.01012	.01012
N=4	.00498	.00494	.00496	.00496
N=5	.00037	.00036	.00036	.00036
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	-.07415	-.07415	-.07415	-.07415
N=5	.00212	.00212	.00212	.00212
N=6	********	********	********	********

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 8.770000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.183422E-02
ROOF B TRANSFER FUNCTIONS (BNR)
.106E-03 .359E-02 .666E-02 .148E-02 .000 .106E+04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.09 .227 -.690E-02 .000 999.
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
  9        1.000      .900      1.000      1.000        70.0        76.0
 10        1.000      .900      1.000      1.000        70.0        76.0
 11         .800      .800       .800       .800        70.0        76.0
 12         .500      .500       .400       .400        70.0        76.0
 13         .800      .800       .800       .800        70.0        76.0
 14        1.000      .900      1.000      1.000        70.0        76.0
 15        1.000      .900      1.000      1.000        70.0        76.0
 16        1.000      .900      1.000      1.000        70.0        76.0
 17        1.000      .800      1.000      1.000        70.0        76.0
 18         .200      .200       .100       .100        70.0        76.0
 19         .100      .000       .000       .000        70.0        76.0
 20         .100      .000       .000       .000        70.0        76.0
 21         .100      .000       .000       .000        70.0        76.0
 22         .100      .000       .000       .000        70.0        76.0
 23         .100      .000       .000       .000        70.0        76.0
 24         .100      .000       .000       .000        70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)            2
SUPPLY AIR CFM (SACFM)     9430.000000
ECONOMIZER HIGH TEMP LIMIT F        68.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100       .191       .200       .286       .300       .369       .400       .451
 .500       .537       .600       .625       .700       .718       .800       .812
 .900       .906      1.00       1.00
CHILLER TYPE (ITYPCH)             4
COOLING PLANT RATED OUTPUT BTU (CFLOT)    360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)     82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000       .000       .000       .000       .000       .000       .000       .000
 .000       .000       .000       .000       .000       .000       .000       .000
 .000       .000       .000       .000
```

BLDG 625 - BATTALION HQ INSTALL 1 IN. FB BATT INSUL. ON ROOF

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-89.71	LOSS		-14.79	-8.87	.00	-17.15	-7.06	-73.35	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.07	.00	.00	.00
	-69.72	LOSS		-12.20	-7.51	.00	-12.81	-5.99	-62.03	.00
MAR	.80	GAIN	11.72	.02	.00	.00	.82	.00	.00	.00
	-54.35	LOSS		-10.88	-6.97	.00	-10.25	-5.56	-56.18	.00
APR	9.57	GAIN	11.93	.25	.04	.00	2.49	.03	.28	1.58
	-20.99	LOSS		-6.28	-4.14	.00	-5.01	-3.30	-31.69	.00
MAY	24.05	GAIN	13.07	.79	.14	.00	4.60	.11	.88	6.12
	-2.75	LOSS		-3.60	-2.47	.00	-2.08	-1.90	-18.44	.00
JUN	59.68	GAIN	13.17	1.56	.40	.00	6.95	.32	2.63	24.86
	.00	LOSS		-1.75	-1.17	.00	-.59	-.90	-8.65	.00
JUL	85.54	GAIN	13.38	2.64	1.02	.00	9.26	.81	6.90	35.82
	.00	LOSS		-1.14	-.72	.00	-.28	-.56	-5.32	.00
AUG	78.91	GAIN	11.73	1.99	.77	.00	7.78	.60	4.99	35.17
	.00	LOSS		-1.26	-.80	.00	-.34	-.61	-5.21	.00
SEP	42.56	GAIN	10.12	.80	.39	.00	4.55	.32	2.76	19.26
	-4.13	LOSS		-3.18	-1.93	.00	-1.88	-1.52	-14.17	.00
OCT	7.74	GAIN	8.62	.09	.06	.00	1.39	.05	.41	2.35
	-18.43	LOSS		-6.84	-3.93	.00	-5.48	-3.06	-28.44	.00
NOV	1.18	GAIN	6.92	.00	.00	.00	.33	.00	.00	.34
	-43.46	LOSS		-9.84	-5.70	.00	-9.85	-4.45	-43.28	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.01	.00	.00	.00
	-87.89	LOSS		-14.70	-8.68	.00	-17.21	-6.83	-70.28	.00
TOT	310.	GAIN	124.	8.	3.	0.	38.	2.	19.	126.
	-391.	LOSS		-86.	-53.	0.	-83.	-42.	-417.	0.

MAX HEATING LOAD= -272020. BTUH ON DEC 18 HOUR 11 AMBIENT TEMP 11.
MAX COOLING LOAD= 288113. BTUH ON JUL 26 HOUR 17 AMBIENT TEMP 93.

ZONE UA BTU/HR-F 1696.1

BLDG 625 - BATTALION HQ INSTALL 1 IN. FB BATT INSUL. ON ROOF

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	COINCIDENT DAY	HR	AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	76.		4	17	62.	3.32	12.81	4.22	24.09
			67.	27	7	4.				
FEB	70.	75.		13	17	64.	2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	77.		12	16	69.	3.26	12.57	4.22	23.72
			69.	4	6	15.				
APR	73.	78.		30	16	84.	3.14	12.09	4.08	22.85
			69.	9	6	30.				
MAY	75.	78.		29	16	85.	3.32	12.81	4.22	24.09
			69.	11	6	39.				
JUN	76.	78.		27	15	89.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	77.	78.		26	15	94.	3.26	12.57	4.22	23.72
			72.	10	6	60.				
AUG	76.	78.		29	16	95.	3.32	12.81	4.22	24.09
			70.	25	7	55.				
SEP	75.	78.		11	15	86.	3.08	11.86	4.08	22.48
			69.	15	6	39.				
OCT	72.	78.		5	15	73.	3.32	12.81	4.22	24.09
			69.	28	6	33.				
NOV	71.	77.		8	16	75.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	73.		12	16	59.	3.20	12.33	4.22	23.35
			64.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ INSTALL 1 IN. FB BATT INSUL. ON ROOF

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	680	0	15	0	-.2720E+06	.0000
FEB	567	0	0	0	-.2580E+06	.0000
MAR	525	22	0	0	-.2592E+06	.1037E+06
APR	276	136	0	0	-.1657E+06	.1525E+06
MAY	50	304	0	0	-.1139E+06	.1978E+06
JUN	0	470	0	0	.0000	.2611E+06
JUL	0	596	0	0	.0000	.2881E+06
AUG	0	572	0	0	.0000	.2614E+06
SEP	79	349	0	0	-.1097E+06	.2464E+06
OCT	278	108	0	0	-.1537E+06	.1848E+06
NOV	481	28	0	0	-.2227E+06	.1255E+06
DEC	711	0	16	0	-.2720E+06	.0000
YEAR	3647	2585	31	0	-.2720E+06	.2881E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	122.73	.00	3.32	12.81	1.24	24.09	12.6
FEB	96.92	.00	2.95	11.38	1.12	21.47	12.6
MAR	78.75	.07	3.26	12.57	1.24	23.72	20.7
APR	33.36	.79	3.14	12.09	1.20	22.85	23.6
MAY	5.01	1.87	3.32	12.81	1.24	24.09	26.7
JUN	.00	4.43	3.14	12.09	1.20	22.85	31.4
JUL	.00	6.37	3.26	12.57	1.24	23.72	33.4
AUG	.00	5.88	3.32	12.81	1.24	24.09	31.4
SEP	7.61	3.21	3.08	11.86	1.20	22.48	30.2
OCT	30.77	.62	3.32	12.81	1.24	24.09	25.7
NOV	65.29	.10	3.20	12.33	1.20	23.22	21.9
DEC	122.09	.00	3.20	12.33	1.24	23.35	12.6
YEAR	562.52	23.35	38.54	148.46	14.55	280.00	33.4

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 167701. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ INSTALL 1 IN. FB BATT INSUL. ON ROOF

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	-	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2720E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2580E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1037E+06	-.2592E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1525E+06	-.1657E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1978E+06	-.1139E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2611E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2881E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2614E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2464E+06	-.1097E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1848E+06	-.1537E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1255E+06	-.2227E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2720E+06

```
BLDG 625 - BATTALION HQ  INSTALL 3.5 IN. FB BATT INSUL. ON ROOF
----------  PROGRAM CONTROL OPTIONS -----------
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)            1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)            0
WEEKEND INTERNAL GAINS FACTOR (WKEND)     5.000000E-01
LAST CASE FLAG (1=YES, 0=NO)  (LSTCS)            1
SKY CLEARNESS FACTOR (CLN)         1.000000
NUMBER OF ZONES (NZ)            1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)            0
--------- SITE AND BUILDING DATA --------------
******REAL WEATHER FROM DISK*******
 FILE NAME SPRNGFMO
STATION 13995   YEAR 1955
SITE LATITUDE DEG (AL1)        37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)      1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)        56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN)        20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA)     6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF)     3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG)     2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO)        70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)        70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS)     9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW)     0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS)     66521.000000
FLOOR AREA (SQFT)      5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX)    272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX)   -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA)     57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI)       435.000000
INFILTRATION PROFILE
 .850      .850      .850      .850      .850      .850      .850      1.00
 1.00      1.00      1.00      1.00      1.00      1.00      1.00      1.00
 1.00      1.00      .850      .850      .850      .850      .850      .850
A FACTOR IN INFILTRATION EQUATION (CINA)     3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB)     2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC)     8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP)     69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF)     0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF)       288.000000
PARTITION UA BTU/HR-F (GUA)     0.000000E+00
DOOR UA BTU/HR-F (DUA)       49.200000
WINDOW GLASS NUMBER (NG)           30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO)     6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN)     6.930472E-01
WINDOW SHADING FACTOR (SHD)     6.200000E-01
```

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.243	.244	.244
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01837	.01822	.01829	.01829
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00003	.00003	.00003	.00003
N=2	.00283	.00280	.00281	.00281
N=3	.01017	.01008	.01012	.01012
N=4	.00498	.00494	.00496	.00496
N=5	.00037	.00036	.00036	.00036
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	-.07415	-.07415	-.07415	-.07415
N=5	.00212	.00212	.00212	.00212
N=6	********	********	********	********

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 5.330000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.014651E-02
ROOF B TRANSFER FUNCTIONS (BNR)
.103E-04 .151E-02 .564E-02 .278E-02 .205E-03 .103E+04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.18 .410 -.444E-01 .500E-03 999.
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
  9        1.000      .900     1.000     1.000        70.0       76.0
 10        1.000      .900     1.000     1.000        70.0       76.0
 11         .800      .800      .800      .800        70.0       76.0
 12         .500      .500      .400      .400        70.0       76.0
 13         .800      .800      .800      .800        70.0       76.0
 14        1.000      .900     1.000     1.000        70.0       76.0
 15        1.000      .900     1.000     1.000        70.0       76.0
 16        1.000      .900     1.000     1.000        70.0       76.0
 17        1.000      .800     1.000     1.000        70.0       76.0
 18         .200      .200      .100      .100        70.0       76.0
 19         .100      .000      .000      .000        70.0       76.0
 20         .100      .000      .000      .000        70.0       76.0
 21         .100      .000      .000      .000        70.0       76.0
 22         .100      .000      .000      .000        70.0       76.0
 23         .100      .000      .000      .000        70.0       76.0
 24         .100      .000      .000      .000        70.0       76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)     9430.000000
ECONOMIZER HIGH TEMP LIMIT F        68.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)            4
COOLING PLANT RATED OUTPUT BTU (CFLOT)   360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 625 - BATTALION HQ INSTALL 3.5 IN. FB BATT INSUL. ON ROOF

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-84.09	LOSS		-8.98	-8.89	.00	-17.18	-7.07	-73.47	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.06	.00	.00	.00
	-65.13	LOSS		-7.40	-7.52	.00	-12.84	-6.01	-62.17	.00
MAR	.88	GAIN	11.72	.05	.00	.00	.80	.00	.00	.02
	-50.50	LOSS		-6.64	-6.99	.00	-10.29	-5.57	-56.44	.00
APR	10.00	GAIN	11.93	.33	.04	.00	2.47	.03	.27	1.60
	-19.27	LOSS		-3.97	-4.15	.00	-5.04	-3.32	-31.87	.00
MAY	24.64	GAIN	13.07	.77	.14	.00	4.58	.11	.88	6.30
	-2.43	LOSS		-2.49	-2.48	.00	-2.10	-1.91	-18.72	.00
JUN	59.71	GAIN	13.17	1.30	.40	.00	6.94	.32	2.63	24.81
	.00	LOSS		-1.41	-1.17	.00	-.59	-.90	-8.64	.00
JUL	84.58	GAIN	13.38	1.93	1.02	.00	9.26	.82	6.90	35.47
	.00	LOSS		-1.01	-.72	.00	-.28	-.56	-5.34	.00
AUG	78.34	GAIN	11.73	1.55	.77	.00	7.77	.60	4.99	34.89
	.00	LOSS		-1.11	-.80	.00	-.34	-.61	-5.20	.00
SEP	42.70	GAIN	10.12	.72	.39	.00	4.53	.32	2.75	19.17
	-3.70	LOSS		-2.19	-1.95	.00	-1.90	-1.53	-14.36	.00
OCT	8.15	GAIN	8.62	.14	.06	.00	1.37	.05	.40	2.44
	-16.62	LOSS		-4.25	-3.96	.00	-5.54	-3.08	-28.81	.00
NOV	1.33	GAIN	6.92	.00	.00	.00	.32	.00	.00	.38
	-40.06	LOSS		-5.99	-5.72	.00	-9.90	-4.46	-43.52	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.01	.00	.00	.00
	-82.26	LOSS		-8.91	-8.69	.00	-17.24	-6.84	-70.39	.00
TOT	310.	GAIN	124.	7.	3.	0.	38.	2.	19.	125.
	-364.	LOSS		-54.	-53.	0.	-83.	-42.	-419.	0.

MAX HEATING LOAD= -272020. BTUH ON DEC 18 HOUR 9 AMBIENT TEMP 3.
MAX COOLING LOAD= 285452. BTUH ON JUL 26 HOUR 17 AMBIENT TEMP 93.

ZONE UA BTU/HR-F 1496.7

BLDG 625 - BATTALION HQ INSTALL 3.5 IN. FB BATT INSUL. ON ROOF

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	76.		4	17	62.	3.32	12.81	4.22	24.09
			68.	27	6	4.				
FEB	70.	75.		13	17	64.	2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	77.		12	15	72.	3.26	12.57	4.22	23.72
			69.	4	6	15.				
APR	73.	78.		30	16	84.	3.14	12.09	4.08	22.85
			69.	9	6	30.				
MAY	75.	78.		29	16	85.	3.32	12.81	4.22	24.09
			69.	11	6	39.				
JUN	76.	78.		27	15	89.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	77.	78.		26	15	94.	3.26	12.57	4.22	23.72
			72.	10	6	60.				
AUG	76.	78.		29	15	96.	3.32	12.81	4.22	24.09
			71.	25	7	55.				
SEP	75.	78.		11	15	86.	3.08	11.86	4.08	22.48
			69.	15	6	39.				
OCT	73.	78.		5	15	73.	3.32	12.81	4.22	24.09
			69.	28	6	33.				
NOV	71.	77.		8	16	75.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	73.		12	17	52.	3.20	12.33	4.22	23.35
			65.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ INSTALL 3.5 IN. FB BATT INSUL. ON ROOF

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	671	1	10	0	-.2720E+06	.0000
FEB	550	0	0	0	-.2481E+06	.0000
MAR	502	25	0	0	-.2497E+06	.1068E+06
APR	256	142	0	0	-.1583E+06	.1545E+06
MAY	45	309	0	0	-.1087E+06	.1974E+06
JUN	0	470	0	0	.0000	.2595E+06
JUL	0	589	0	0	.0000	.2855E+06
AUG	0	569	0	0	.0000	.2612E+06
SEP	75	350	0	0	-.1050E+06	.2452E+06
OCT	256	116	0	0	-.1477E+06	.1855E+06
NOV	463	35	0	0	-.2129E+06	.1277E+06
DEC	698	0	13	0	-.2720E+06	.0000
YEAR	3516	2606	23	0	-.2720E+06	.2855E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
MONTH	HEATING MILLION BTU	COOLING THOUSAND KWH	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FANS THOUSAND KWH	HEAT GAIN MILLION BTU	ELECTRIC DEMAND KW
JAN	116.26	.00	3.32	12.81	1.24	24.09	12.6
FEB	91.11	.00	2.95	11.38	1.12	21.47	12.6
MAR	73.64	.08	3.26	12.57	1.24	23.72	20.9
APR	30.65	.82	3.14	12.09	1.20	22.85	23.7
MAY	4.46	1.92	3.32	12.81	1.24	24.09	26.6
JUN	.00	4.43	3.14	12.09	1.20	22.85	31.3
JUL	.00	6.30	3.26	12.57	1.24	23.72	33.2
AUG	.00	5.84	3.32	12.81	1.24	24.09	31.4
SEP	7.01	3.21	3.08	11.86	1.20	22.48	30.2
OCT	27.89	.65	3.32	12.81	1.24	24.09	25.8
NOV	60.94	.11	3.20	12.33	1.20	23.22	22.1
DEC	115.41	.00	3.20	12.33	1.24	23.35	12.6
YEAR	527.37	23.37	38.54	148.46	14.55	280.00	33.2

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 161649. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ INSTALL 3.5 IN. FB BATT INSUL. ON ROOF

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2720E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2481E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1068E+06	-.2497E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1545E+06	-.1583E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1974E+06	-.1087E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2595E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2855E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2612E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2452E+06	-.1050E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1855E+06	-.1477E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1277E+06	-.2129E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2720E+06

BLDG 625 - BATTALION HQ INSTALL 6 IN. FB BATT INSUL. ON ROOF

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.850	.850	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.243	.244	.244
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01837	.01822	.01829	.01829
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00003	.00003	.00003	.00003
N=2	.00283	.00280	.00281	.00281
N=3	.01017	.01008	.01012	.01012
N=4	.00498	.00494	.00496	.00496
N=5	.00037	.00036	.00036	.00036
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	-.07415	-.07415	-.07415	-.07415
N=5	.00212	.00212	.00212	.00212
N=6	********	********	********	********

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.740000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.989166E-04
ROOF B TRANSFER FUNCTIONS (BNR)

.000	.183E-05	.275E-04	.907E-04	.678E-04	.128E-04

ROOF D TRANSFER FUNCTIONS (DNR)

1.00	-1.97	1.36	-.410	.534E-01	-.250E-02

SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

9	1.000	.900	1.000	1.000	70.0	76.0
10	1.000	.900	1.000	1.000	70.0	76.0
11	.800	.800	.800	.800	70.0	76.0
12	.500	.500	.400	.400	70.0	76.0
13	.800	.800	.800	.800	70.0	76.0
14	1.000	.900	1.000	1.000	70.0	76.0
15	1.000	.900	1.000	1.000	70.0	76.0
16	1.000	.900	1.000	1.000	70.0	76.0
17	1.000	.800	1.000	1.000	70.0	76.0
18	.200	.200	.100	.100	70.0	76.0
19	.100	.000	.000	.000	70.0	76.0
20	.100	.000	.000	.000	70.0	76.0
21	.100	.000	.000	.000	70.0	76.0
22	.100	.000	.000	.000	70.0	76.0
23	.100	.000	.000	.000	70.0	76.0
24	.100	.000	.000	.000	70.0	76.0

NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 9430.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.000000
SYSTEM MIXED AIR TEMP(TMXAIR) 55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)

.100	.191	.200	.286	.300	.369	.400	.451
.500	.537	.600	.625	.700	.718	.800	.812
.900	.906	1.00	1.00				

CHILLER TYPE (ITYPCH) 4
COOLING PLANT RATED OUTPUT BTU (CFLOT) 360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)

.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000				

BLDG 625 - BATTALION HQ INSTALL 6 IN. FB BATT INSUL. ON ROOF

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-76.45	LOSS		-1.13	-8.90	.00	-17.21	-7.08	-73.62	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.06	.00	.00	.00
	-58.93	LOSS		-.93	-7.54	.00	-12.89	-6.02	-62.34	.00
MAR	.94	GAIN	11.72	.00	.00	.00	.78	.00	.00	.02
	-45.16	LOSS		-.82	-7.02	.00	-10.33	-5.59	-56.71	.00
APR	10.37	GAIN	11.93	.01	.04	.00	2.43	.03	.27	1.64
	-16.81	LOSS		-.47	-4.19	.00	-5.08	-3.34	-32.11	.00
MAY	25.18	GAIN	13.07	.03	.14	.00	4.54	.11	.87	6.48
	-1.92	LOSS		-.24	-2.52	.00	-2.16	-1.94	-19.16	.00
JUN	60.38	GAIN	13.17	.09	.40	.00	6.92	.32	2.62	25.55
	.00	LOSS		-.09	-1.19	.00	-.62	-.91	-8.72	.00
JUL	84.51	GAIN	13.38	.18	1.02	.00	9.25	.82	6.90	36.33
	.00	LOSS		-.05	-.73	.00	-.29	-.57	-5.45	.00
AUG	78.93	GAIN	11.73	.13	.77	.00	7.76	.60	4.98	35.96
	.00	LOSS		-.05	-.81	.00	-.36	-.62	-5.27	.00
SEP	43.52	GAIN	10.12	.05	.39	.00	4.51	.32	2.74	19.82
	-2.94	LOSS		-.21	-1.97	.00	-1.94	-1.55	-14.61	.00
OCT	8.73	GAIN	8.62	.00	.06	.00	1.34	.05	.39	2.68
	-14.07	LOSS		-.51	-4.00	.00	-5.62	-3.12	-29.31	.00
NOV	1.48	GAIN	6.92	.00	.00	.00	.31	.00	.00	.40
	-35.41	LOSS		-.75	-5.76	.00	-9.96	-4.49	-43.86	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.01	.00	.00	.00
	-74.68	LOSS		-1.12	-8.71	.00	-17.27	-6.85	-70.54	.00
TOT	314.	GAIN	124.	0.	3.	0.	38.	2.	19.	129.
	-326.	LOSS		-6.	-53.	0.	-84.	-42.	-422.	0.

MAX HEATING LOAD= -272020. BTUH ON DEC 18 HOUR 8 AMBIENT TEMP 1.
MAX COOLING LOAD= 283232. BTUH ON JUL 23 HOUR 14 AMBIENT TEMP 68.

ZONE UA BTU/HR-F 1404.6

BLDG 625 - BATTALION HQ INSTALL 6 IN. FB BATT INSUL. ON ROOF

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	76.		4	17	62.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	70.	76.		13	17	64.	2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	78.		12	15	72.	3.26	12.57	4.22	23.72
			69.	4	6	15.				
APR	73.	78.		30	16	84.	3.14	12.09	4.08	22.85
			69.	9	6	30.				
MAY	75.	78.		15	15	80.	3.32	12.81	4.22	24.09
			70.	11	6	39.				
JUN	76.	78.		27	15	89.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	77.	78.		13	15	91.	3.26	12.57	4.22	23.72
			73.	10	6	60.				
AUG	77.	78.		30	14	87.	3.32	12.81	4.22	24.09
			71.	25	7	55.				
SEP	75.	78.		11	14	85.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73.	78.		5	15	73.	3.32	12.81	4.22	24.09
			69.	28	6	33.				
NOV	71.	77.		8	16	75.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	74.		12	17	52.	3.20	12.33	4.22	23.35
			67.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ INSTALL 6 IN. FB BATT INSUL. ON ROOF

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	655	2	1	0	-.2720E+06	.0000
FEB	535	0	0	0	-.2328E+06	.0000
MAR	477	29	0	0	-.2352E+06	.1053E+06
APR	239	149	0	0	-.1465E+06	.1556E+06
MAY	38	317	0	0	-.9832E+05	.1914E+06
JUN	0	483	0	0	.0000	.2522E+06
JUL	0	607	0	0	.0000	.2832E+06
AUG	0	589	0	0	.0000	.2581E+06
SEP	65	367	0	0	-.9601E+05	.2404E+06
OCT	236	130	0	0	-.1368E+06	.1826E+06
NOV	435	39	0	0	-.1979E+06	.1295E+06
DEC	684	0	10	0	-.2720E+06	.0000
YEAR	3364	2712	11	0	-.2720E+06	.2832E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
MONTH	HEATING MILLION BTU	COOLING THOUSAND KWH	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FANS THOUSAND KWH	HEAT GAIN MILLION BTU	ELECTRIC DEMAND KW
JAN	107.33	.00	3.32	12.81	1.24	24.09	12.6
FEB	83.80	.00	2.95	11.38	1.12	21.47	12.6
MAR	66.94	.08	3.26	12.57	1.24	23.72	20.8
APR	27.42	.85	3.14	12.09	1.20	22.85	23.8
MAY	3.62	1.96	3.32	12.81	1.24	24.09	26.2
JUN	.00	4.50	3.14	12.09	1.20	22.85	30.7
JUL	.00	6.32	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.91	3.32	12.81	1.24	24.09	31.2
SEP	5.79	3.29	3.08	11.86	1.20	22.48	29.8
OCT	24.50	.70	3.32	12.81	1.24	24.09	25.6
NOV	54.85	.13	3.20	12.33	1.20	23.22	22.2
DEC	106.70	.00	3.20	12.33	1.24	23.35	12.6
YEAR	480.95	23.72	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 153847. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ INSTALL 6 IN. FB BATT INSUL. ON ROOF

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2720E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2328E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1053E+06	-.2352E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1556E+06	-.1465E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1914E+06	-.9832E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2522E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2832E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2581E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2404E+06	-.9601E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1826E+06	-.1368E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1295E+06	-.1979E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2720E+06

BLDG 625 - BATTALION HQ INSTALL 9 IN. FB BATT INSUL. ON ROOF

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.850	.850	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.243	.244	.244
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01837	.01822	.01829	.01829
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00003	.00003	.00003	.00003
N=2	.00283	.00280	.00281	.00281
N=3	.01017	.01008	.01012	.01012
N=4	.00498	.00494	.00496	.00496
N=5	.00037	.00036	.00036	.00036
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	-.07415	-.07415	-.07415	-.07415
N=5	.00212	.00212	.00212	.00212
N=6	********	********	********	********

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 2.650000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.409436E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .130E-05 .195E-04 .643E-04 .481E-04 .909E-05
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
  9        1.000      .900      1.000     1.000        70.0       76.0
 10        1.000      .900      1.000     1.000        70.0       76.0
 11         .800      .800       .800      .800        70.0       76.0
 12         .500      .500       .400      .400        70.0       76.0
 13         .800      .800       .800      .800        70.0       76.0
 14        1.000      .900      1.000     1.000        70.0       76.0
 15        1.000      .900      1.000     1.000        70.0       76.0
 16        1.000      .900      1.000     1.000        70.0       76.0
 17        1.000      .800      1.000     1.000        70.0       76.0
 18         .200      .200       .100      .100        70.0       76.0
 19         .100      .000       .000      .000        70.0       76.0
 20         .100      .000       .000      .000        70.0       76.0
 21         .100      .000       .000      .000        70.0       76.0
 22         .100      .000       .000      .000        70.0       76.0
 23         .100      .000       .000      .000        70.0       76.0
 24         .100      .000       .000      .000        70.0       76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)      65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)      65.000000
SYSTEM TYPE, (IECN)          2
SUPPLY AIR CFM (SACFM)    9430.000000
ECONOMIZER HIGH TEMP LIMIT F       68.000000
SYSTEM SUPPLY AIR START TIME HR    0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR       24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)      55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)    1.000000E-01
FAN EFFICIENCY (EFAN)    5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)    8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906      1.00      1.00
CHILLER TYPE (ITYPCH)           4
COOLING PLANT RATED OUTPUT BTU (CFLOT)   360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 625 - BATTALION HQ INSTALL 9 IN. FB BATT INSUL. ON ROOF

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-76.14	LOSS		-.80	-8.90	.00	-17.21	-7.08	-73.63	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.06	.00	.00	.00
	-58.67	LOSS		-.66	-7.55	.00	-12.89	-6.03	-62.35	.00
MAR	.94	GAIN	11.72	.00	.00	.00	.78	.00	.00	.02
	-44.96	LOSS		-.58	-7.02	.00	-10.33	-5.59	-56.73	.00
APR	10.40	GAIN	11.93	.00	.04	.00	2.43	.03	.27	1.64
	-16.72	LOSS		-.33	-4.19	.00	-5.09	-3.34	-32.13	.00
MAY	25.21	GAIN	13.07	.02	.14	.00	4.54	.11	.87	6.48
	-1.90	LOSS		-.17	-2.52	.00	-2.16	-1.94	-19.18	.00
JUN	60.33	GAIN	13.17	.06	.40	.00	6.92	.32	2.62	25.49
	.00	LOSS		-.06	-1.19	.00	-.62	-.91	-8.72	.00
JUL	84.42	GAIN	13.38	.13	1.02	.00	9.25	.82	6.90	36.28
	.00	LOSS		-.03	-.73	.00	-.29	-.57	-5.45	.00
AUG	78.84	GAIN	11.73	.09	.77	.00	7.76	.60	4.98	35.90
	.00	LOSS		-.04	-.81	.00	-.36	-.62	-5.27	.00
SEP	43.53	GAIN	10.12	.03	.39	.00	4.51	.32	2.74	19.82
	-2.93	LOSS		-.15	-1.97	.00	-1.94	-1.55	-14.62	.00
OCT	8.75	GAIN	8.62	.00	.06	.00	1.34	.05	.39	2.68
	-13.97	LOSS		-.36	-4.01	.00	-5.63	-3.12	-29.34	.00
NOV	1.49	GAIN	6.92	.00	.00	.00	.31	.00	.00	.40
	-35.23	LOSS		-.53	-5.76	.00	-9.97	-4.49	-43.88	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.01	.00	.00	.00
	-74.37	LOSS		-.79	-8.71	.00	-17.28	-6.85	-70.55	.00
TOT	314.	GAIN	124.	0.	3.	0.	38.	2.	19.	129.
	-325.	LOSS		-5.	-53.	0.	-84.	-42.	-422.	0.

MAX HEATING LOAD= -272020. BTUH ON DEC 18 HOUR 8 AMBIENT TEMP 1.
MAX COOLING LOAD= 283348. BTUH ON JUL 23 HOUR 14 AMBIENT TEMP 68.

ZONE UA BTU/HR-F 1341.4

BLDG 625 - BATTALION HQ INSTALL 9 IN. FB BATT INSUL. ON ROOF

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	76.		4	17	62.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	70.	76.		13	17	64.	2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	78.		12	15	72.	3.26	12.57	4.22	23.72
			69.	4	6	15.				
APR	73.	78.		30	16	84.	3.14	12.09	4.08	22.85
			69.	9	6	30.				
MAY	75.	78.		15	15	80.	3.32	12.81	4.22	24.09
			70.	11	6	39.				
JUN	76.	78.		27	15	89.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	77.	78.		13	15	91.	3.26	12.57	4.22	23.72
			73.	10	6	60.				
AUG	77.	78.		30	14	87.	3.32	12.81	4.22	24.09
			71.	25	7	55.				
SEP	75.	78.		11	14	85.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73.	78.		5	15	73.	3.32	12.81	4.22	24.09
			69.	28	6	33.				
NOV	71.	77.		8	16	75.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	74.		12	17	52.	3.20	12.33	4.22	23.35
			67.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ INSTALL 9 IN. FB BATT INSUL. ON ROOF

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	655	2	1	0	-.2720E+06	.0000
FEB	534	0	0	0	-.2322E+06	.0000
MAR	476	29	0	0	-.2347E+06	.1056E+06
APR	238	150	0	0	-.1461E+06	.1557E+06
MAY	37	318	0	0	-.9805E+05	.1914E+06
JUN	0	482	0	0	.0000	.2521E+06
JUL	0	606	0	0	.0000	.2833E+06
AUG	0	588	0	0	.0000	.2581E+06
SEP	65	368	0	0	-.9577E+05	.2404E+06
OCT	234	130	0	0	-.1365E+06	.1827E+06
NOV	435	39	0	0	-.1974E+06	.1297E+06
DEC	684	0	10	0	-.2720E+06	.0000
YEAR	3358	2712	11	0	-.2720E+06	.2833E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	107.00	.00	3.32	12.81	1.24	24.09	12.6
FEB	83.49	.00	2.95	11.38	1.12	21.47	12.6
MAR	66.68	.08	3.26	12.57	1.24	23.72	20.8
APR	27.29	.85	3.14	12.09	1.20	22.85	23.8
MAY	3.54	1.96	3.32	12.81	1.24	24.09	26.2
JUN	.00	4.49	3.14	12.09	1.20	22.85	30.7
JUL	.00	6.31	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.90	3.32	12.81	1.24	24.09	31.2
SEP	5.78	3.29	3.08	11.86	1.20	22.48	29.8
OCT	24.29	.70	3.32	12.81	1.24	24.09	25.6
NOV	54.68	.13	3.20	12.33	1.20	23.22	22.2
DEC	106.38	.00	3.20	12.33	1.24	23.35	12.6
YEAR	479.13	23.71	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 153526. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ INSTALL 9 IN. FB BATT INSUL. ON ROOF

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2720E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2322E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1056E+06	-.2347E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1557E+06	-.1461E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1914E+06	-.9805E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2521E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2833E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2581E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2404E+06	-.9577E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1827E+06	-.1365E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1297E+06	-.1974E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2720E+06

BLDG 625 - BATTALION HQ INSTALL 12 IN. FB BATT INSUL. ON ROOF

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA --------------

******REAL WEATHER FROM DISK*******
FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.850	.850	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.243	.244	.244
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01837	.01822	.01829	.01829
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00003	.00003	.00003	.00003
N=2	.00283	.00280	.00281	.00281
N=3	.01017	.01008	.01012	.01012
N=4	.00498	.00494	.00496	.00496
N=5	.00037	.00036	.00036	.00036
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	-.07415	-.07415	-.07415	-.07415
N=5	.00212	.00212	.00212	.00212
N=6	********	********	********	********

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 2.190000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.164779E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .107E-05 .161E-04 .531E-04 .397E-04 .751E-05
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	BTU/HR			THERMOSTAT SET POINT DEG F	
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
  9        1.000      .900      1.000      1.000        70.0        76.0
 10        1.000      .900      1.000      1.000        70.0        76.0
 11         .800      .800       .800       .800        70.0        76.0
 12         .500      .500       .400       .400        70.0        76.0
 13         .800      .800       .800       .800        70.0        76.0
 14        1.000      .900      1.000      1.000        70.0        76.0
 15        1.000      .900      1.000      1.000        70.0        76.0
 16        1.000      .900      1.000      1.000        70.0        76.0
 17        1.000      .800      1.000      1.000        70.0        76.0
 18         .200      .200       .100       .100        70.0        76.0
 19         .100      .000       .000       .000        70.0        76.0
 20         .100      .000       .000       .000        70.0        76.0
 21         .100      .000       .000       .000        70.0        76.0
 22         .100      .000       .000       .000        70.0        76.0
 23         .100      .000       .000       .000        70.0        76.0
 24         .100      .000       .000       .000        70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)          2
SUPPLY AIR CFM (SACFM)     9430.000000
ECONOMIZER HIGH TEMP LIMIT F        68.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)             4
COOLING PLANT RATED OUTPUT BTU (CFLOT)    360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)     82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 625 - BATTALION HQ INSTALL 12 IN. FB BATT INSUL. ON ROOF

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-76.00	LOSS		-.66	-8.90	.00	-17.22	-7.08	-73.64	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.06	.00	.00	.00
	-58.57	LOSS		-.55	-7.55	.00	-12.89	-6.03	-62.36	.00
MAR	.95	GAIN	11.72	.00	.00	.00	.78	.00	.00	.02
	-44.87	LOSS		-.48	-7.02	.00	-10.33	-5.59	-56.74	.00
APR	10.41	GAIN	11.93	.00	.04	.00	2.43	.03	.27	1.64
	-16.68	LOSS		-.27	-4.19	.00	-5.09	-3.34	-32.13	.00
MAY	25.22	GAIN	13.07	.02	.14	.00	4.54	.11	.87	6.48
	-1.90	LOSS		-.14	-2.52	.00	-2.16	-1.94	-19.19	.00
JUN	60.33	GAIN	13.17	.05	.40	.00	6.92	.32	2.62	25.49
	.00	LOSS		-.05	-1.19	.00	-.62	-.91	-8.72	.00
JUL	84.34	GAIN	13.38	.11	1.02	.00	9.25	.82	6.90	36.21
	.00	LOSS		-.03	-.73	.00	-.29	-.57	-5.45	.00
AUG	78.83	GAIN	11.73	.07	.77	.00	7.76	.60	4.98	35.90
	.00	LOSS		-.03	-.81	.00	-.36	-.62	-5.27	.00
SEP	43.54	GAIN	10.12	.03	.39	.00	4.51	.32	2.74	19.82
	-2.92	LOSS		-.12	-1.97	.00	-1.94	-1.55	-14.63	.00
OCT	8.76	GAIN	8.62	.00	.06	.00	1.34	.05	.39	2.68
	-13.94	LOSS		-.30	-4.01	.00	-5.63	-3.12	-29.35	.00
NOV	1.49	GAIN	6.92	.00	.00	.00	.31	.00	.00	.40
	-35.15	LOSS		-.44	-5.76	.00	-9.97	-4.49	-43.89	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.01	.00	.00	.00
	-74.23	LOSS		-.66	-8.71	.00	-17.28	-6.85	-70.55	.00
TOT	314.	GAIN	124.	0.	3.	0.	38.	2.	19.	129.
	-324.	LOSS		-4.	-53.	0.	-84.	-42.	-422.	0.

MAX HEATING LOAD= -272020. BTUH ON DEC 18 HOUR 8 AMBIENT TEMP 1.
MAX COOLING LOAD= 283394. BTUH ON JUL 23 HOUR 14 AMBIENT TEMP 68.

ZONE UA BTU/HR-F 1314.7

BLDG 625 - BATTALION HQ INSTALL 12 IN. FB BATT INSUL. ON ROOF

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	76.		4	17	62.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	70.	76.		13	17	64.	2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	78.		12	15	72.	3.26	12.57	4.22	23.72
			69.	4	6	15.				
APR	73.	78.		30	16	84.	3.14	12.09	4.08	22.85
			69.	9	6	30.				
MAY	75.	78.		15	15	80.	3.32	12.81	4.22	24.09
			70.	11	6	39.				
JUN	76.	78.		27	15	89.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	77.	78.		13	15	91.	3.26	12.57	4.22	23.72
			73.	10	6	60.				
AUG	77.	78.		30	14	87.	3.32	12.81	4.22	24.09
			71.	25	7	55.				
SEP	75.	78.		11	14	85.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73.	78.		5	15	73.	3.32	12.81	4.22	24.09
			69.	28	6	33.				
NOV	71.	77.		8	16	75.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	74.		12	17	52.	3.20	12.33	4.22	23.35
			67.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ INSTALL 12 IN. FB BATT INSUL. ON ROOF

	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED		NUMBER OF HOURS WHEN LOADS WERE NOT MET		MAXIMUM LOADS BTU	
MONTH	HEATING	COOLING INCLUDING ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	655	2	1	0	-.2720E+06	.0000
FEB	534	0	0	0	-.2320E+06	.0000
MAR	475	30	0	0	-.2345E+06	.1051E+06
APR	238	150	0	0	-.1459E+06	.1558E+06
MAY	37	317	0	0	-.9794E+05	.1914E+06
JUN	0	482	0	0	.0000	.2521E+06
JUL	0	605	0	0	.0000	.2834E+06
AUG	0	588	0	0	.0000	.2581E+06
SEP	65	369	0	0	-.9566E+05	.2404E+06
OCT	234	130	0	0	-.1364E+06	.1827E+06
NOV	435	39	0	0	-.1972E+06	.1298E+06
DEC	684	0	10	0	-.2720E+06	.0000
YEAR	3357	2712	11	0	-.2720E+06	.2834E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	106.87	.00	3.32	12.81	1.24	24.09	12.6
FEB	83.38	.00	2.95	11.38	1.12	21.47	12.6
MAR	66.55	.08	3.26	12.57	1.24	23.72	20.8
APR	27.26	.85	3.14	12.09	1.20	22.85	23.8
MAY	3.54	1.96	3.32	12.81	1.24	24.09	26.2
JUN	.00	4.49	3.14	12.09	1.20	22.85	30.7
JUL	.00	6.30	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.90	3.32	12.81	1.24	24.09	31.2
SEP	5.77	3.29	3.08	11.86	1.20	22.48	29.8
OCT	24.26	.70	3.32	12.81	1.24	24.09	25.6
NOV	54.61	.13	3.20	12.33	1.20	23.22	22.2
DEC	106.25	.00	3.20	12.33	1.24	23.35	12.6
YEAR	478.47	23.71	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 153410. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ INSTALL 12 IN. FB BATT INSUL. ON ROOF

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM NOT MET COOL	HOURS WHEN SYSTEM NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2720E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2320E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1051E+06	-.2345E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1558E+06	-.1459E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1914E+06	-.9794E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2521E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2834E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2581E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2404E+06	-.9566E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1827E+06	-.1364E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1298E+06	-.1972E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2720E+06

APPENDIX D

ECO ANALYSIS BACKUP DATA AND FIELD SURVEY FORMS

GENERAL

The first section of Appendix D contains general backup data that was used in the ECO analysis calculations for all the buildings evaluated. The general backup data includes:

- Material and labor cost data tables
- Manufacturers literature and cost data.

ECO ANALYSIS BACKUP DATA

The subsequent sections of Appendix D contain the ECO analysis backup data for each of the ten representative buildings evaluated. Each representative building tab includes the following data in the order listed:

- Annual Energy Savings Summary (energy savings are extrapolated to similar buildings)
- Investment Cost Summary (investment costs are extrapolated to similar buildings)
- Life Cycle Cost Analyses (LCCAs)
- Engineer's Opinion of Probable Costs
- BEACON Computer Simulation Data
- Field Survey Forms

MATERIAL & LABOR COST LOOK UP TABLE

PROJECT	Limited Energy Study, Insulate Brick Buildings,Fort Leonard, MO	**DATE PREPARED**	10-Jan-96
ENGINEER	E M C Engineers, Inc.	**PREPARED BY**	D.Sinz
	Denver, CO	**CHECKED BY**	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	Material Average Cost	Location Adj. Cost 0.954	Labor Code	Labor Cost/Hr.	Labor Time (Hrs)	"95 Means Facilities" Line No.	"95 Means Facilities" Page No.
1	CONT	CONTINGENCY			20%					
2	DIFF	DIFFICULTLY FACTOR			5%					
3	I1-1/2RI	INSTALL 1-1/2" RIGID INSULATION	S.F.	$0.62	$0.59	1-CARP	$26.3	0.008	670	211
4	I3-1/2I	INSTALL 3-1/2" BATT INSULATION	S.F.	$0.19	$0.18	1-CARP	$26.3	0.007	100	211
5	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	$1.92	$1.83	2-TILE	$48.4	0.084	5400	294
6	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	$0.21	$0.20	2-CARP	$52.5	0.017	350	272
7	IFS	INSTALL 3/4"x2" FURRING STRIPS	L.F.	$0.20	$0.19	1-CARP	$26.3	0.016	302	190
8	ISW	INSTALL 2"x4" STUDDED WALL 2' OC	L.F.	$0.25	$0.24	F-2	$55.1	0.009	502	190
9	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	$0.07	$0.07	1-PORD	$24.1	0.010	240	297
10	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDED	S.F.	$0.84	$0.84	2-CARP	$52.5	0.020	Estimate	
11	IWB-5/8	INSTALL 5/8" WATERPRF BRD - TAPED & SANDED	S.F.	$0.96	$0.96	2-CARP	$52.5	0.020	Estimate	
12	OH	OVERHEAD			17%					
13	PRO	PROFIT			10%					
14	R12WMH	RELOCATE 12' BASEBOARD RADIATION	EA.	$19.28	$18.39	Q-6	$87.5	5.25	100	408
15	R15B	RELOCATE 15' HIGH 104' LONG BLEACHERS	EA.	$0.00	$0.00	F-5	$109.4	56.00	3300	330
16	R15WMH	RELOCATE 15' BASEBOARD RADIATION	EA.	$19.28	$18.39	Q-6	$87.5	5.00	100	408
17	R24WMH	RELOCATE 24' BASEBOARD RADIATION	EA.	$19.28	$18.39	Q-6	$87.5	5.68	100	408
18	R25CS	RELOCATE 24'x8'x2' CLOTHING SHELVES	EA.	$0.00	$0.00	1-SSWK	$29.0	2.46	2200	315
19	R2SSS	RELOCATE 2' STAINLESS STEEL SHELF	EA.	$0.00	$0.00	1-CARP	$26.3	0.533	5600	316
20	R30CS	RELOCATE 30'x8'x2' CLOTHING SHELVES	EA.	$0.00	$0.00	1-SSWK	$29.0	2.705	2200	315
21	R3WP	RELOCATE 3'-0" AFF WOOD PANELING	S.F.	$0.95	$0.91	F-2	$55.1	0.063	2420	197
22	R4WMH	RELOCATE 4'-0" BASEBOARD RADIATION	EA.	$19.28	$18.39	Q-6	$87.5	4.48	100	408
23	R6WMH	RELOCATE 6' BASEBOARD RADIATION	EA.	$19.28	$18.39	Q-6	$87.5	4.68	100	408
24	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	L.F.	$1.20	$1.14	1-CARP	$26.3	0.134	700	280
25	RBBR	RELOCATE BASKETBALL BACKBOARD & RIM	EA.	$0.00	$0.00	L-2	$46.4	24.00	1250	330
26	RBM	RELOCATE BATHROOM MIRROR	EA.	$0.00	$0.00	1-CARP	$26.3	0.356	100	266
27	RBS	RELOCATE BATHROOM SINK	EA.	$18.43	$17.58	Q-1	$56.3	7.35	1140	406
28	RCD	RELOCATE PART OF CLOSET DOOR FRAME	EA.	$28.67	$27.35	1-CARP	$26.3	0.44	440	237
29	RDR	RELOCATE DRAPERIES, WINDOW SHADES	EA.	$0.00	$0.00	L-2	$46.4	0.744	400	339
30	RDV	RELOCATE DRYER VENT	EA.	$12	$11.45	1-CARP	$26.3	1.30	7450	327
31	REC	RELOCATE 3/4" ELECTRICAL CONDUIT	L.F.	$1.22	$1.16	1-ELEC	$30.4	0.089	2530	638
32	REDS	RELOCATE ELECTRIC DISCONNECT SWITCH	EA.	$0	$0.00	1-ELEC	$30.4	5.20	100	717
33	REES	RELOCATE ELECTRICAL EXIT SIGN	EA.	$0.00	$0.00	1-ELEC	$30.4	1.50	80	765
34	REJB	RELOCATE ELECTRICAL JUNCTION BOX	EA.	$8.20	$7.82	1-ELEC	$30.4	1.30	160	691

MATERIAL & LABOR COST LOOK UP TABLE

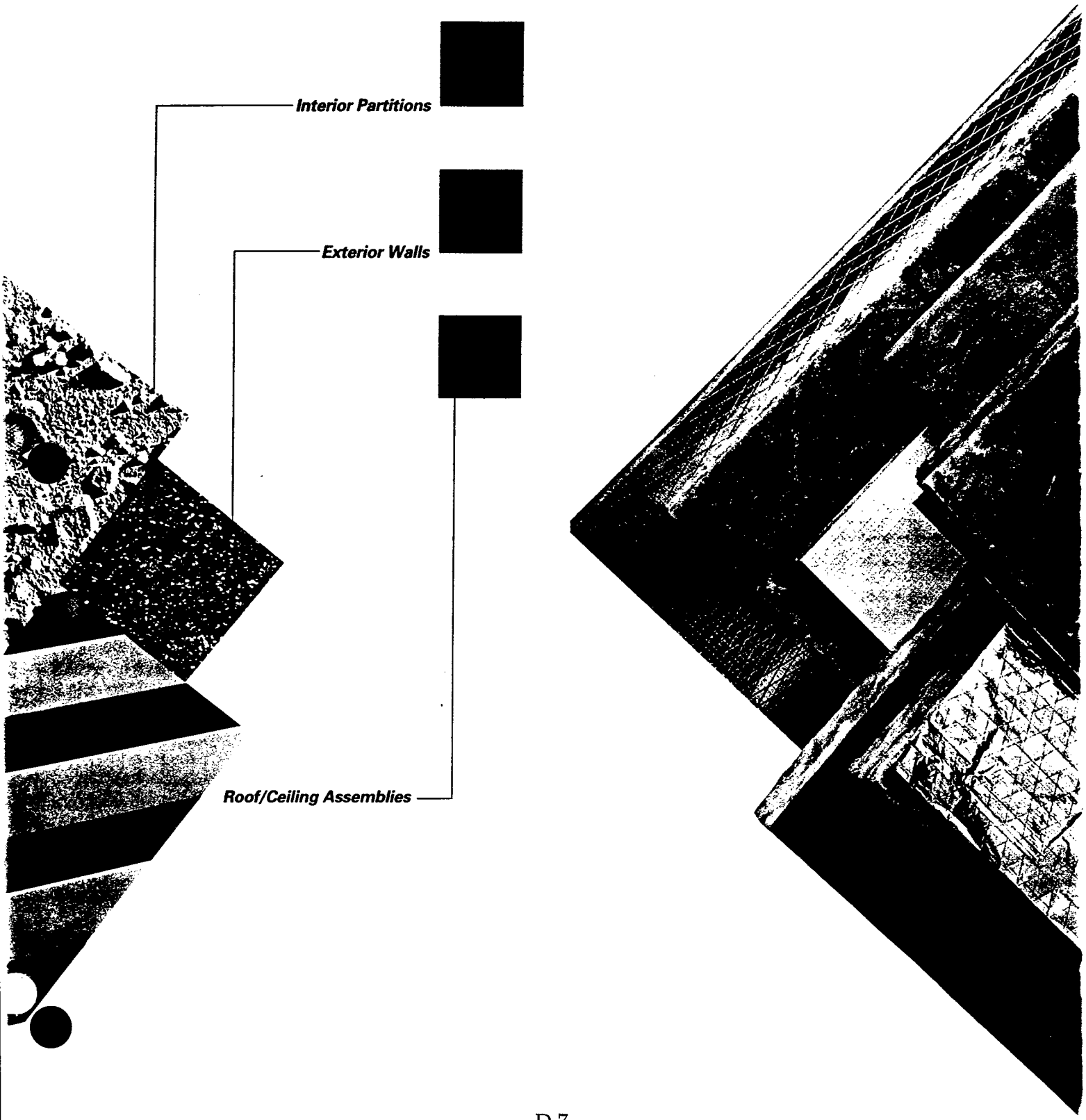
PROJECT	Limited Energy Study, Insulate Brick Buildings,Fort Leonard, MO	**DATE PREPARED**	**10-Jan-96**
ENGINEER	E M C Engineers, Inc.	**PREPARED BY**	D.Sinz
	Denver, CO	**CHECKED BY**	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	Material Average Cost	Location Adj. Cost 0.954	Labor Code	Labor Cost/Hr.	Labor Time (Hrs)	"95 Means Facilities" Line No.	"95 Means Facilities" Page No.
35	REL	RELOCATE EMERGENCY LIGHT	EA.	$0	$0.00	1-ELEC	$30.4	3.25	500	765
36	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	$9.25	$8.82	1-ELEC	$30.4	0.844	600	691
37	REO	RELOCATE ELECTRICAL OUTLET	EA.	$8.35	$7.97	1-ELEC	$30.4	0.896	700	691
38	REP	RELOCATE ELECTRICAL PANEL	EA.	$0	$0.00	1-ELEC	$30.4	12.191	150	723
39	RES	RELOCATE ELECTRIC SCOREBOARD	EA.	$0	$0.00	R-3	$103.6	24.00	7300	331
40	RFAPB	RELOCATE FIRE ALARM PULL BOX	EA.	$0.00	$0.00	1-ELEC	$30.4	1.60	7000	782
41	RFCU	RELOCATE FAN COIL UNIT	EA.	$21.28	$20.30	Q-6	$87.5	5.67	100	408
42	RFE	RELOCATE FIRE EXTINGUISHER	EA.	$0.00	$0.00	1-CARP	$26.3	0.20	5000	513
43	RFSAG	RELOCATE FLOOR SUPPLY AIR GRILLES	EA.	$4.00	$3.82	1-SHEE	$30.0	1.69	1120	601
44	RFSS	RELOCATE FIRE SUPPRESSION SYSTEM	EA.	$0.00	$0.00	Q-2	$87.6	16.00	Estimate	
45	RGL	REMOVE GYM LOCKER	EA.	$0.00	$0.00	1-CARP	$26.3	0.90	Estimate	
46	RKB	RELOCATE KEY BOX	EA.	$0.00	$0.00	1-CARP	$26.3	0.65	10	336
47	RLKS	RELOCATE LARGE KITCHEN SINK	EA.	$74.50	$71.07	Q-1	$56.3	16.751	1050	499
48	RMWRC	RELOCATE MAPLE WALL IN RACQUETBALL CRT.	EA.	$8,775	$8,371.35	3-CARP	$78.8	88.00	900	368
49	RPDMS	RELOCATE PULL DOWN MOVIE SCREEN	S.F.	$0.00	$0.00	2-CARP	$52.5	1.50	300	323
50	RRG	RELOCATE RETURN AIR GRILLE	EA.	$0.00	$0.00	1-SHEE	$30.0	4.00	Estimate	
51	RS	RELOCATE SPEAKER	EA.	$0.00	$0.00	1-ELEC	$30.4	1.50	400	787
52	RSD	RELOCATE SOAP DISPENSER	EA.	$0.00	$0.00	1-CARP	$26.3	0.70	5000	316
53	RSS	RELOCATE SLOP SINK	EA.	$40.18	$38.33	Q-1	$56.3	5.67	100	498
54	RT	RELOCATE THERMOSTAT	EA.	$0.00	$0.00	1-ELEC	$30.4	1.70	5030	596
55	RTB	RELOCATE 8 TELEPHONE BOOTHS	EA.	$0.00	$0.00	3-CARP	$78.8	48.00	Estimate	
56	RTJ	RELOCATE TELEPHONE JACK	EA.	$21.00	$20.03	1-ELEC	$30.4	0.33	2510	681
57	RTS	RELOCATE TOILET STALL	EA.	$0.00	$0.00	2-CARP	$52.5	3.54	1700	302
58	RU	RELOCATE URINAL	EA	$81.50	$77.75	Q-1	$56.3	13.49	3000	501
59	RWC	RELOCATE WALL CABINET	EA.	$0.00	$0.00	1-CARP	$26.3	1.70	4700	201
60	RWHD	RELOCATE WALL HAND DRYER	EA.	$0.00	$0.00	1-CARP	$26.3	3.20	2300	316
61	RWMTS	RELOCATE WALL MOUNTED TELEVISION SET	EA.	$30.10	$28.72	L-2	$46.4	3.42	Estimate	
62	RWP	RELOCATE 1/2" HW & CW DOMESTIC PIPING	EA.	$26.26	$25.05	Q-1	$56.3	4.55	1140	406
63	RWPL	RELOCATE WALL PLACARD	EA.	$0.00	$0.00	1-CARP	$26.3	0.65	Estimate	
64	RWS	RELOCATE WOOD SHELF	L.F.	$1.28	$1.22	1-CARP	$26.3	0.12	10	196
65	RWTC	RELOCATE WATER CLOSET	EA.	$37.56	$35.83	Q-2	$87.6	10.90	3300	502

LABOR COST LOOK UP TABLE

SHEET	1	OF	1
PROJECT	Fort Leonard Wood Wall Insulation Feasibility Study	DATE PREPARED	18-Feb-96
ENGINEER	E M C Engineers, Inc.	PREPARED BY	D. Sinz
	Denver, CO	CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Average Cost $/hr	Location Adj. Cost 1.068	"95 Means" Page No.
1	1-CARP	CARPENTER	$24.60	$26.27	Back Cover
2	1-ELEC	ELECTRICIAN	$28.50	$30.44	Back Cover
3	1-PORD	ONE PAINTER	$22.60	$24.14	Back Cover
4	1-SHEE	SHEET METAL WORKER	$28.10	$30.01	Back Cover
5	1-SSWK	STRUCTURAL STEEL WORKERS	$27.15	$29.00	962
6	2-CARP	TWO CARPENTERS	$49.20	$52.55	962
7	2-TILE	TWO CERAMIC TILE WORKERS	$45.35	$48.43	Back Cover
8	3-CARP	THREE CARPENTERS	$73.80	$78.82	962
9	F-2	TWO CARPENTERS, TWO POWER TOOLS	$51.60	$55.11	961
10	F-5	1 FOREMAN, 3 CARP, 2 PWR TOOLS	$102.40	$109.36	961
11	L-2	CARPENTER & HELPER	$43.45	$46.40	962
12	Q-1	PLUMPER & APPRENTICE	$52.75	$56.34	962
13	Q-2	TWO PLUMBERS & ONE PLUMBER APPRENTICE	$82.05	$87.63	962
14	Q-6	STEAM FITTER CREW	$81.90	$87.47	963
15	Q-9	SHEET METAL CREW	$50.60	$54.04	963
16	R-3	1 FOREMAN, 1 ELEC., .5 EQ. OPER., .5 S.P. CRAN	$97.04	$103.64	963
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					


Interior Partitions
Exterior Walls
Roof/Ceiling Assemblies

Thermal Batt Insulation

- ***Provides excellent acoustical control, ratings to STC 64***
- ***Useful in a wide range of interior partition applications***
- ***Easy to install and fabricate***
- ***Dimensional stability assures in-place performance***

Technical Data

	Thickness	Width	Length	R-value*
Metal Frame Construction	3½" 89mm	16" 406mm | 24" 609mm	96" 2438mm	11.0
	3½" 89mm	16" 406mm | 24" 609mm	96" 2438mm	13.0
	6¼" 159mm	16" 406mm | 24" 609mm	96" 2438mm	19.0
Wood Frame Construction	3½" 89mm	15" 381mm | 23" 584mm	93" 2362mm	11.0
	3½" 89mm	15" 381mm | 23" 584mm	93" 2362mm	13.0
	3½" 89mm	15" 381mm | 23" 584mm	93" 2362mm	15.0
	6¼" 159mm	15" 381mm | 23" 584mm	93" 2362mm	19.0
	5½" 139mm	15" 381mm | 23" 584mm	93" 2362mm	21.0

Unfaced Thermal Batt Insulation complies with the property requirements of ASTM C 665, Type I and ASTM E 136. Kraft-faced Thermal Batt Insulation complies with ASTM C 665, Type II, Class C. Foil-faced Thermal Batt Insulation complies with ASTM C 665, Type III, Class B.

Surface Burning Characteristics*/ Building Code Construction Classifications

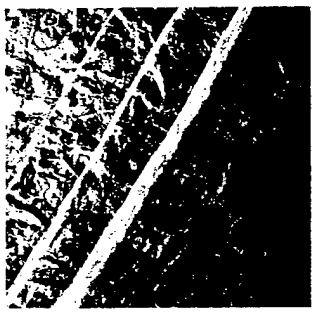
	Flame Spread	Smoke Developed	ICBO	BOCAI	SBCCI
Unfaced	10	10	All types	All types	All types
Foil-faced	75	150	III, IV, V	All types	All types
Kraft-faced	N/R	N/R	III, IV, V	3, 4, 5	III, V, VI

Thermal Batt Insulation complies with ICBO (Uniform Building Code), BOCAI (National Building Code) and SBCCI (Standard Building Code) model code requirements for building construction types listed above.

Kraft and standard foil facings on Thermal Batt Insulation will burn and must not be left exposed. Install facings in substantial contact with the finish material. Protect from open flame or other heat source.

Due to the potential for skin irritation, unfaced Thermal Batt Insulation should not be used for exposed application where it will be subject to human contact.

Available Vapor Retarder Facings	**Kraft**	**Foil**
Perms Maximum*	1.00	0.50
Water Absorption		
Maximum by Volume	Less than 0.05%	
Dimensional Stability		
Linear Shrinkage	Less than 0.1%	



* *Products are tested in accordance with:*

R-value	*ASTM C 518*
Surface Burning Characteristics	*ASTM E 84*
Perm Rating	*ASTM E 96*

Exterior Walls

design considerations

General Fire Safety

Kraft and standard foil-faced vapor retarders will burn and must not be left exposed. Install facings in contact with the finish material. Protect facing from open flame or other heat source. Check local codes for application limitations.

Moisture Control

Moisture and its effects are all too often given minimum consideration in the design and construction of buildings. Accumulation of moisture in the building envelope can cause structural damage and reduce thermal performance. • The need for a vapor retarder in commercial construction can be determined by calculating the building's occupancy-moisture rating. Detailed information on calculating the occupancy-moisture rating and on the effects of moisture control in building design and construction can be found in Chapter 20 of the 1989 ASHRAE Handbook of Fundamentals. • In northern heating dominated climates vapor retarders should generally be installed as close to the warm side of the building envelope as possible. In other climates the architect or specifier should evaluate the requirements of each project before making decisions about the use and placement of vapor retarders. • Adequate ventilation of the interior space and of certain sections of the building envelope is also an important consideration. Proper design and installation of a vapor retarder can also help minimize air infiltration and reduce the latent load on the HVAC system. • Maintaining the integrity of the vapor retarder may be important for effective moisture/humidity control. Insulation boards and batts should tightly abut adjacent insulation. Repair any punctures or tears in the facing by taping. Follow the tape manufacturer's application recommendations.

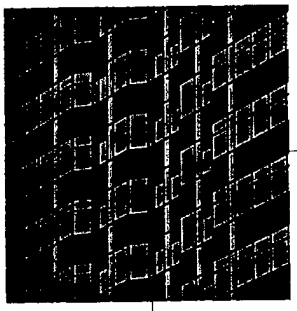
Thermal Expansion and Contraction

When insulation is added to the inside perimeter of a structure, the area outside the insulation becomes exposed to greater temperature extremes. Building structures should be inspected to ensure they can withstand the additional expansion and contraction forces. Check for piping which should be protected against freezing.

Curtainwall Fire Safety

Tests conducted by Owens-Corning at Southwest Research Institute on aluminum curtainwall spandrel panels indicate that curtainwall insulation should be used for thermal control purposes only and is ineffective in preventing the spread of fire from floor-to-floor. Buildings utilizing curtainwall construction should be equipped with a sprinkler system to provide adequate fire protection.

☐ metal



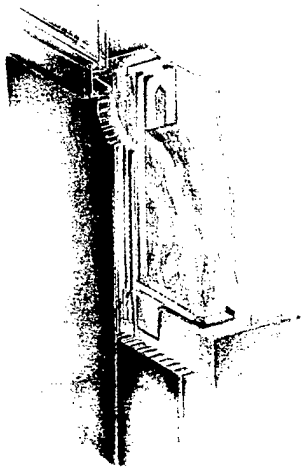
metal panel curtainwall

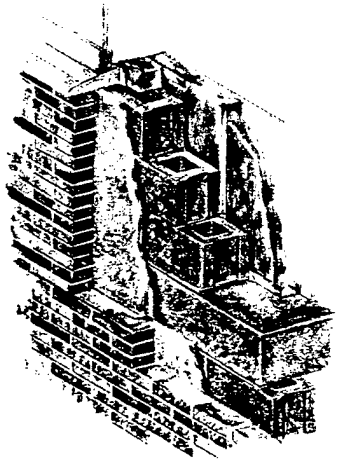
Product Options

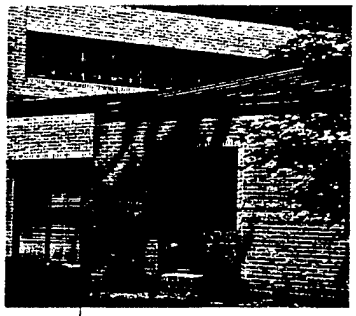
Curtainwall Insulation
700 Series Insulation

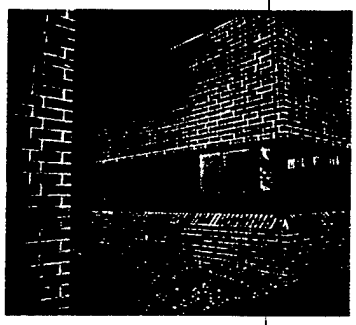
Installation & Design Considerations

- Establish thermal breaks to reduce condensation on cold surfaces.
- Utilize self-weeping curtainwall grid system to vent moisture build-up in the wall cavity.
- The need for and placement of vapor retarders should be determined by the building designer.
- Minimize penetrations of insulation by structural elements, wall attachment devices, etc. In constructions utilizing a vapor retarder, careful consideration should be given to maintaining vapor retarder integrity.
- Buildings utilizing curtainwall construction should be equipped with a sprinkler system to provide adequate fire protection.
- Provide code required fire separation between floors.







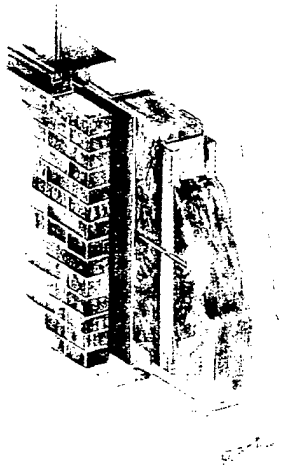


☐ masonry

masonry wall

Product Options
Thermal Batt Insulation
Flame Spread 25 Insulation
700 Series Insulation

Installation & Design Considerations
- Maintain minimum 1" air space or other capillary break between masonry and insulation. Use weep holes at flashing locations to vent moisture build-up in the wall cavity.
- Insulation between brick and block must be held in contact with the exterior face of the concrete block to maintain air space.
- The need for and placement of vapor barriers should be determined by the building designer.
- Minimize penetrations of insulation by structural elements, wall attachment devices, etc. In constructions utilizing a vapor retarder, careful consideration should be given to maintaining vapor retarder integrity.
- When specifying kraft-faced or standard foil-faced insulation check local code requirements for limitations and install facing in substantial contact with finish surface.



☐ metal frame

brick and metal frame wall

Product Options
Thermal Batt Insulation
Flame Spread 25 Insulation

Installation & Design Considerations
- Maintain minimum 1" air space or other capillary break between masonry and insulation. Use weep holes at flashing locations to vent moisture build-up in the wall cavity.
- Maintain air space between sheathing and brick.
- The need for and placement of vapor retarders should be determined by the building designer.
- Minimize penetrations of insulation by structural elements, wall attachment devices, etc. In constructions utilizing a vapor retarder, careful consideration should be given to maintaining vapor retarder integrity.
- When specifying kraft-faced or standard foil-faced insulation check local code requirements for limitations and install facing in substantial contact with finish surface.

** Drawings are not intended to provide complete detail. Architect must supply detailed drawings to meet project and building code requirements.*

Owens-Corning Sales Offices

Alabama
Birmingham
205-991-9791
Mobile
205-476-5571

Arizona
Phoenix
602-996-5540

California
Sacramento
916-721-5525
Redwood City
415-598-9550
Santa Ana
714-433-2440

Colorado
Denver
303-292-3255

Connecticut
Hartford
203-688-7778

Florida
Orlando
407-788-0870
Tampa
813-248-3310

Georgia
Atlanta
404-352-6767

Idaho
Boise
208-362-3771

Illinois
Chicago
708-215-5900

Indiana
Elkhart
219-294-7228

Kansas
Kansas City
913-451-2563

Maryland
Hanover
410-712-0050

Massachusetts
Boston
617-849-1340

Michigan
Detroit
313-967-1300

Minnesota
Minneapolis
612-522-6449

Missouri
St. Louis
314-298-9550

New Jersey
Hasbrouck Heights
201-288-8233

New York
Rochester
716-924-0530
Syracuse
315-455-5601

North Carolina
Raleigh
919-872-0823

Ohio
Cincinnati
513-281-1173
Cleveland
216-884-9440

Oregon
Portland
503-223-9618

Pennsylvania
Harrisburg
717-652-8503
Philadelphia
215-688-8650

South Carolina
Columbia
803-781-4390

Tennessee
Knoxville
615-531-0243
Memphis
901-369-9495

Texas
Dallas
214-448-8670
Houston
713-872-0671

Utah
Salt Lake City
801-943-4089

Virginia
Richmond
804-379-9127

Washington
Seattle
206-562-4700

Wisconsin
Milwaukee
414-259-0700

Owens-Corning World Headquarters
Toledo
419-248-8000

OWENS-CORNING WORLD HEADQUARTERS
FIBERGLAS TOWER
TOLEDO, OHIO 43659

RESIDENTIAL AND COMMERCIAL INSULATION

Pub. No. 5-BL-17956-A Printed in U.S.A., May 1993 Copyright © 1993 Owens-Corning Fiberglas Corporation

A417
07200/CEM
BuyLine 6679

Foam Sheathing Professional Design Manual



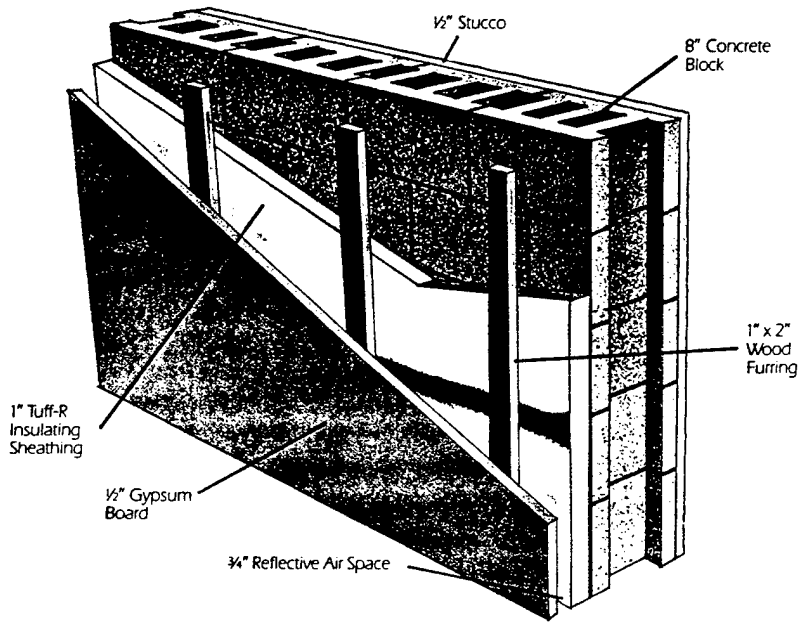
Masonry Wall Systems

Masonry Wall Systems

Celotex® Foam Sheathing is an ideal insulation for masonry or concrete wall construction because the material's thin profile makes the application of high efficiency insulation not only easy but also economical.

In some of these systems, sheathing is applied on the interior side of masonry or concrete wall construction. Thermax® Sheathing can be left exposed in unoccupied basement areas and covered later with code approved interior finish. **Tuff-R® insulating Sheathing products must not be left exposed and must be covered with minimum ½" gypsum board.**

In this system, the Celotex foil-faced foam sheathings with taped joints and sealed penetrations serve as an effective vapor retarder. A variation of this system would be to install the furring strips against the concrete block with the foam sheathing over the furring.



System R-value

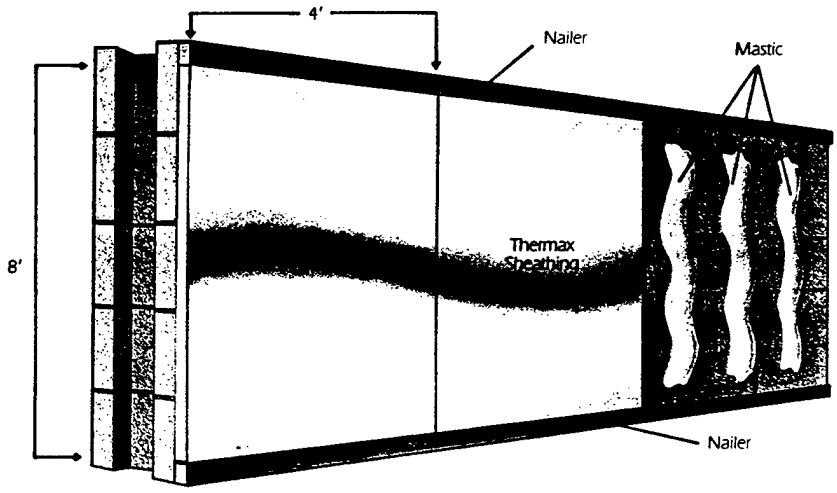
The design R-value for such a wall system would be calculated as follows assuming a 15% framing factor for 1" x 2" wood furring 24" o.c.

	R-values Through Furring	R-values Between Furring
Inside surface film	0.68	0.68
½" Gypsum board	0.45	0.45
1" x 2" Wood furring	0.94	—
¾" Reflective air space	—	2.77
1" Insulating Sheathing	7.7	7.7
8" Concrete block	1.11	1.11
½" Stucco	0.10	0.10
Outside surface film	0.17	0.17
R-value at sections	11.15	12.98

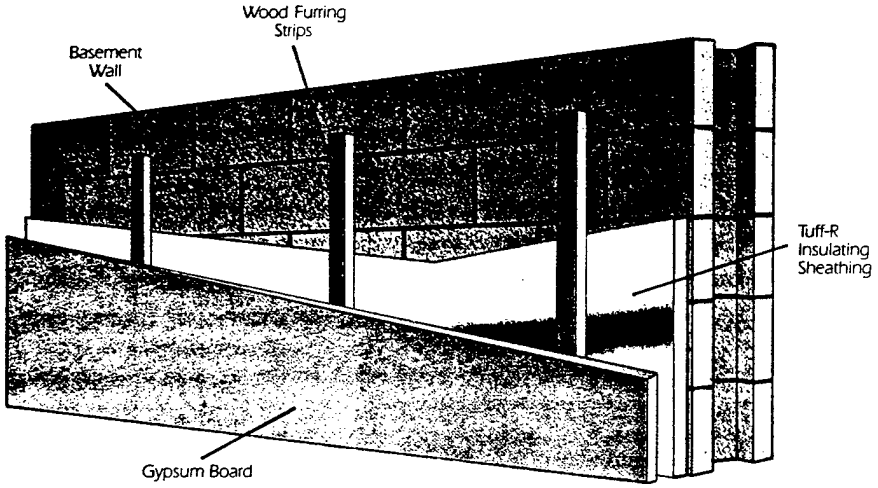
Total design U-value $= \frac{.15}{11.15} + \frac{.85}{12.98} = .079$ Total design R-value $= \frac{1}{.079} = 12.66$

R-value calculations at 75°F mean temperature.

BETTER In this case, all major work is completed for the home owner. Wood nailers the thickness of the Thermax to be applied are installed at the top and bottom of the walls. Thermax is then installed between the wood nailers with good construction adhesive. The home owner can later add gypsum wallboard or paneling by gluing the center of the material to the Thermax and nailing it top and bottom in to the wood nailers. Baseboard and top molding can also be installed easily with mechanical fasteners.



Thermax Sheathing Thickness:	¾"	1"	1½"	2"	2½"	3"
R-value @ 75°F Mean Temp:	5.4	7.2	10.8	14.4	18.0	21.6



BEST Today, many builders use the costly approach of furring out basement walls with two by four studs between which fiberglass insulation and a vapor retarder are installed. After electrical wiring is run through the walls, gypsum wallboard is applied.

The Tuff-R system is at least twice as fast to install. Tuff-R Insulating Sheathing is temporarily adhered to the walls and furring strips are installed either 16 or 24 inches on center. The furring strips can allow the use of flat electrical boxes and create a reflective dead air space which adds an R-value of 2.8 at no cost.

The furring also provides a raceway for wiring and a sound base for nailing gypsum wallboard or paneling in place to produce finished basement walls which appear expensive, but are in fact economical.

Tuff-R Insulating Sheathing Nominal Board Thickness:	¾"	1"	1½"	2"
Product R-value	5.8	7.7	11.5	15.4
System R-value* w/¾" air space @ 75°F Mean Temp:	8.6	10.5	14.3	18.2

*System R-value calculated through cavity and includes 1/2" gypsum board (R = .45), 3/4" reflective air space (R = 2.77) and Tuff-R only. Calculations based on ASHRAE Handbook of Fundamentals.

Do not leave Tuff-R Insulating Sheathing exposed. It must be covered with minimum 1/2" gypsum board or equivalent thermal barrier interior finish.

Warnings

Thermax® Sheathing

Warning: Celotex® Thermax foil-faced products should only be used in strict accordance with Celotex' recommended uses and application instructions. The use of these Thermax products or other thermal insulations, in conjunction with exposed combustible building components, may contribute to rapid spread of fire. Thermax foil-faced products by themselves, or Thermax foil-faced products used in conjunction with non-combustible building components, will burn but will not contribute to rapid spread of fire. The above conclusions are based upon fire tests conducted on unoccupied structures and upon nationally recognized fire tests. Thermax foil-faced products, like wood and other organic materials, can release toxic smoke if ignited.

Tuff-R® Insulating Sheathing

WARNING: DO NOT LEAVE EXPOSED. THESE PRODUCTS WILL BURN AND, IF EXPOSED TO A FIRE OF SUFFICIENT HEAT AND INTENSITY, MAY BURN RAPIDLY. TUFF-R INSULATING SHEATHING PRODUCTS, LIKE WOOD AND OTHER ORGANIC MATERIALS, CAN RELEASE TOXIC SMOKE IF IGNITED. TUFF-R INSULATING SHEATHING PRODUCTS SHOULD ONLY BE USED IN STRICT ACCORDANCE WITH CELOTEX' RECOMMENDED USES AND APPLICATION INSTRUCTIONS. TUFF-R INSULATING SHEATHING PRODUCTS MUST BE INSTALLED BEHIND MINIMUM ½" GYPSUM BOARD OR ITS EQUIVALENT THERMAL BARRIER INTERIOR FINISH.

Thermax Sheathing and Tuff-R Insulating Sheathing products, when applied in accordance with Celotex instructions, meet requirements of the model building codes, various insurance authorities and other regulatory bodies in a wide variety of recommended applications.

Characteristics, properties or performance of materials manufactured by The Celotex Corporation herein described are derived from data obtained under controlled test conditions. Celotex makes no warranties, express or implied, as to their characteristics, properties or performance under any variations from such conditions in actual construction. The Celotex Corporation assumes no responsibility for the effects of structural movement.

Any deviation from these instructions voids all warranties including implied warranties of merchantability and fitness for a particular purpose.

Thermax Sheathing and Tuff-R Insulating Sheathing products are protected by one or more of the following U.S. Patents:

3,903,346 4,028,158 4,169,921 4,346,133
3,940,517 4,043,719 4,284,683 4,386,983
4,411,949 4,572,865 RE30984

Additional Information

Further information concerning the products, systems, and test methods described in this publication can be obtained by contacting The Celotex Corporation, Tampa, or one of its Regional Sales Offices listed below.

The systems in this book are for illustration purposes only. The structural integrity of such systems is the responsibility of the design engineers, architects, component manufacturers, applicators and erectors.

Regional Sales Offices, Manufacturing Plants and Export Sales

ATLANTA
2700 Cumberland Parkway
Suite 330
Atlanta, Georgia 30339
Phone (404) 436-8005
800-654-7332 (Outside Georgia)

CHICAGO
Touhy Office Plaza
1400 E. Touhy Ave.
Suite 336
Des Plaines, Illinois 60018
Phone (708) 298-1943

CINCINNATI
9403 Kenwood Road
Suite B 201
Cincinnati, Ohio 45242
Phone (513) 792-8210
800-543-8638

DALLAS
13601 Preston Road
Suite 628 West
Dallas, Texas 75240
Phone (214) 661-1406
800-523-4684
800-443-0064 (Texas only)

PHILADELPHIA
996 Old Eagle School Road
Wayne, Pennsylvania 19087
Phone (215) 964-1925

WESTERN BUILDING PRODUCTS REGION
6400 Stevenson Boulevard
Fremont, California 94538
Phone (415) 490-0491
800-227-1216

MANUFACTURING PLANTS
1255 North 5th Street
Charleston, Illinois 61920
Phone (217) 348-8176
800-637-2044

1500 John Tipton Blvd.
Pennsauken, New Jersey 08110
Phone (609) 663-2626
800-257-5313

P.O. Box 5884
Texarkana, Arkansas 75501
Phone (501) 774-3685
800-THERMAX

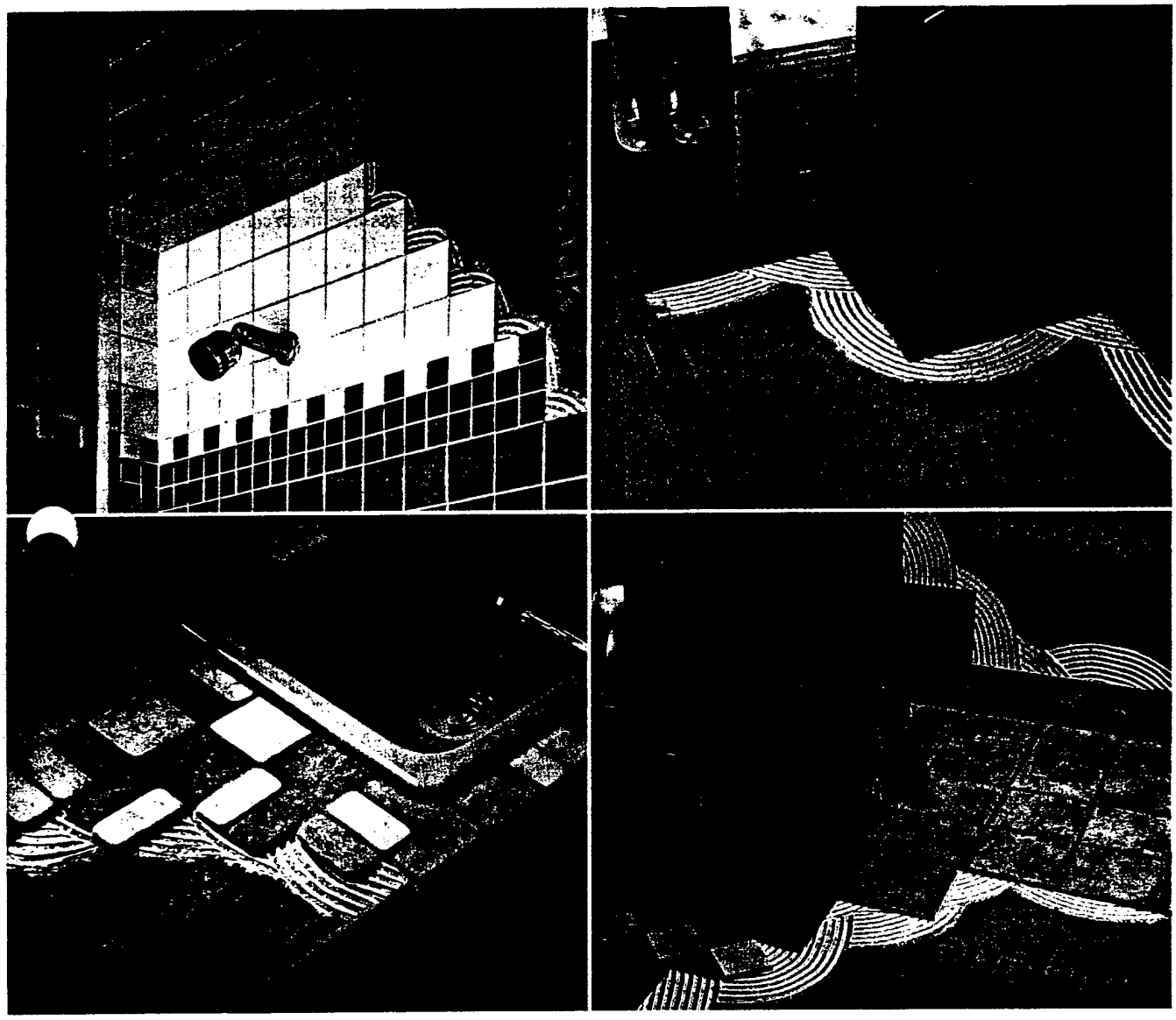
EXPORT
Jim Walter International
Sales Corporation
4010 Boy Scout Boulevard
Tampa, Florida 33607
FAX: (813) 873-4287
Telex No. 159788 JWISC

Celotex, Thermax, Tuff-R, and Quik-R
are trademarks of The Celotex Corporation



BUILDING PRODUCTS DIVISION
THE CELOTEX CORPORATION
POST OFFICE BOX 31602
TAMPA, FLORIDA 33631

DUROCK Multi-Purpose Cement Board Systems



The best substrate for ceramic tile

- **Water resistant**
- **Easy to score and snap**
- **Won't shrink and swell like wood substrates**

DUROCK Cement Board, the multi-purpose building panel, offers architects, builders and tile contractors a strong, water-damage resistant tile base for tub and shower areas. Also an ideal underlayment for tile on floors and counter tops in new construction and remodeling. Board is readily applied over wood or steel framing spaced 16" o.c. with DUROCK Wood or Steel Screws or galvanized roofing nails. After joints are treated, ceramic wall or floor tile is applied using latex fortified mortar or Type I organic adhesive.

The ½" thick DUROCK Cement Boards are listed by Underwriters Laboratories, Inc., for use with UL-listed solid-fuel room heaters and fireplace stoves. Used as a wall shield, board reduces by two-thirds the manufacturer-specified clearance (minimum 12") between room heater or stove and combustible wall surface. Board may also be used as a floor protector in place of one layer of ⅜" thick millboard. For hearth extensions see Specification 3.6B on page 8.

In addition to standard ½" DUROCK Cement Board, DUROCK Underlayment is available for floors and counter tops. Its nominal ¼" thickness helps eliminate transition trim when abutting carpet or wood flooring and helps minimize level variations with other finish materials. Its 4'x4' size is easy to handle and helps cut down on waste. Applies directly over old substrate on counter tops to save time.

DUROCK Exterior Cement Board is preferred by many applicators for its added strength in interior applications. However, its primary use is as a base for USG Exterior Textured Finish and other finish options used in building exteriors. See *SA-700 USG Exterior Products & Systems* for complete information on the applications of this product.

Features and Benefits

High performance—DUROCK Cement Board possesses high flexural and compressive strength, hardness and impact resistance.

Smooth or textured—Board is smooth on one side for mastic applications, textured on other side for mortar applications. Textured surface enhances bonding and reduces tile slip.

Dimensionally stable—Board is rigid and exhibits excellent water-damage resistance properties as a permanent tile base. It will not swell, soften, decay, delaminate or disintegrate.

Fire-resistant—DUROCK Cement Board is a non-combustible panel. Assemblies with ½" DUROCK Cement Board have achieved 1 and 2 hr. fire-resistance ratings. Surface burning characteristics for DUROCK Cement Board: flame spread 5, smoke developed 0.

Lighter weight—At approximately 3 psf, the ½" thick board weighs only one-fourth the weight of a 1" thick metal lath and cement plaster bed.

Easy installation—DUROCK Cement Board is easy to cut and fasten with DUROCK Screws or galvanized roofing nails. Simple dry panel application eliminates cement mixing and drying time, shortening job schedules and lowering in-place cost.

Sound control—Sound isolation ratings up to 65 STC are offered with steel-framed partitions.

Convenient sizes—DUROCK Cement Board may be ordered in sizes to meet job requirements. ½" and ⅝" thicknesses, custom lengths from 32" to 96", and 32", 36" or 48" widths are available.

Versatile application—DUROCK Cement Board provides a smooth, sound base for glass and ceramic mosaics; ceramic and quarry tile; lugged tile; USG Exterior Textured Finish; thin stone tile and thin brick. Suitable for application to wood or steel framing spaced 16" o.c. in new construction and in remodeling. Board is ideal for use in partitions, walls, floors, soffits and ceilings in wet or dry areas. It is highly durable in high-moisture areas found in baths, showers, kitchens and laundry rooms. Also adaptable for fences, fireplace fronts, mobile home skirting, agricultural buildings, UL-listed wall shield/floor protector, garage wainscoting and exterior chimneys.

Limitations

1. Systems using DUROCK Cement Board are designed for positive or negative uniform loads up to 30 psf. (See *SA-700 USG Exterior Products & Systems* for complete information on finishing DUROCK Exterior Cement Board and for uniform loads up to 40 psf.)
2. Maximum stud spacing: 16" o.c. (24" o.c. for cavity shaft wall assembly); maximum allowable deflection, based on stud properties only, L/360. Maximum fastener spacing: 8" o.c. for wood and steel framing; 6" o.c. for ceiling applications.
3. Maximum dead load for ceiling system is 7.5 psf.
4. Steel framing must be 20 ga. or heavier.
5. Do not use drywall screws or drywall nails.
6. Not recommended for vinyl flooring.

Product Data

Material: Formed in a continuous process of aggregated portland cement slurry with polymer-coated, glass-fiber mesh completely encompassing edges, back and front surfaces.
Edges: Formed smooth—Patent No. 4,916,004.
Ends: Square cut.

Sizes and Packaging

	Thickness		Width		Length		Ship. Units
Type	Standard	Custom[1]	Standard	Custom[1]	Standard	Custom[1]	(pcs)[2]
Cement Board	½"	⅝"	32", 36"	48"	5'	3' to 8'	50
	½"	⅝"	32"		8'	4' to 8'	30
Underlayment	¼"		48"		4'	4' to 8'	40
Exterior Cement Board	½"	⅝"	48"	32"	8'	4' to 10'	20

(1) Minimum quantity required for custom sizes.
(2) Stretch-wrapped and shipped in packaging units as shown.

Building Code Data

See National Evaluation Service Report Nos. 259 and 396 for allowable values and/or conditions of use concerning material presented in this document. These reports are subject to reexamination, revisions and possible changes.

Standards

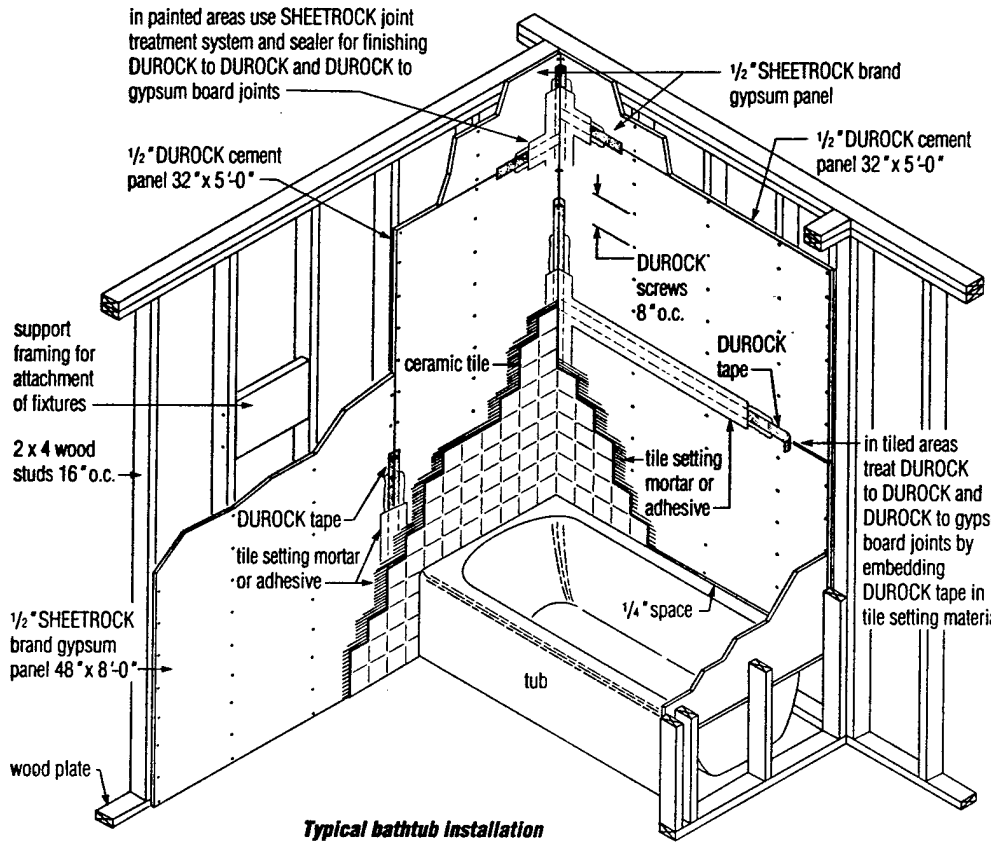
DUROCK Cement Board exceeds the ANSI Standards for cementitious backer units (CBU). See ANSI A118.9-1990 for Test Methods and Specifications for CBU and ANSI 108.11-1990 for Interior Installation of CBU.

LISTED 34L2
For floor protectors and wall shields.

Typical Physical Properties

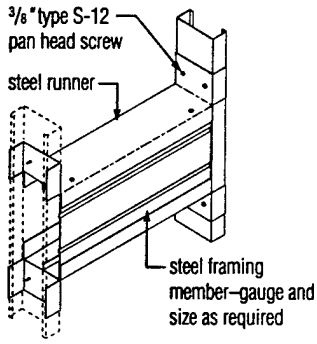
Property	ASTM test reference	Cement board value	Underlayment value	Exterior board value
Flexural strength-psi	C947-81	750	1250	1000
Indentation strength—psi 1" dia. disc @ 0.02" indent.	D2394	2300	2300	2300
Uniform load—psf studs 16" o.c.	—	30 max.	—	40 max.
Water absorption-% by wt. 24 hrs.	C473-84	10	10	10
Nail pull resistance—lb. 0.4" head diameter (wet or dry)	C473-84	125	—	125
Weight—psf	C473-84	3	2	3
Freeze/thaw resistance—procedure B number of cycles with no deterioration	C666-84	100	100	100
Surface burning characteristics—flame/smoke	E84-84	5/0	5/0	5/0
Thermal "R"/k value	C177	0.26/1.92	—	0.26/1.92
Standard method for evaluating ceramic floor tile installation systems	C627	Residential	Residential	—
Min. bending radius[1]—ft.	—	8	—	8

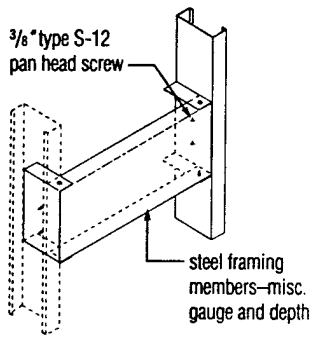
(1) Requires special framing. Details available on request.

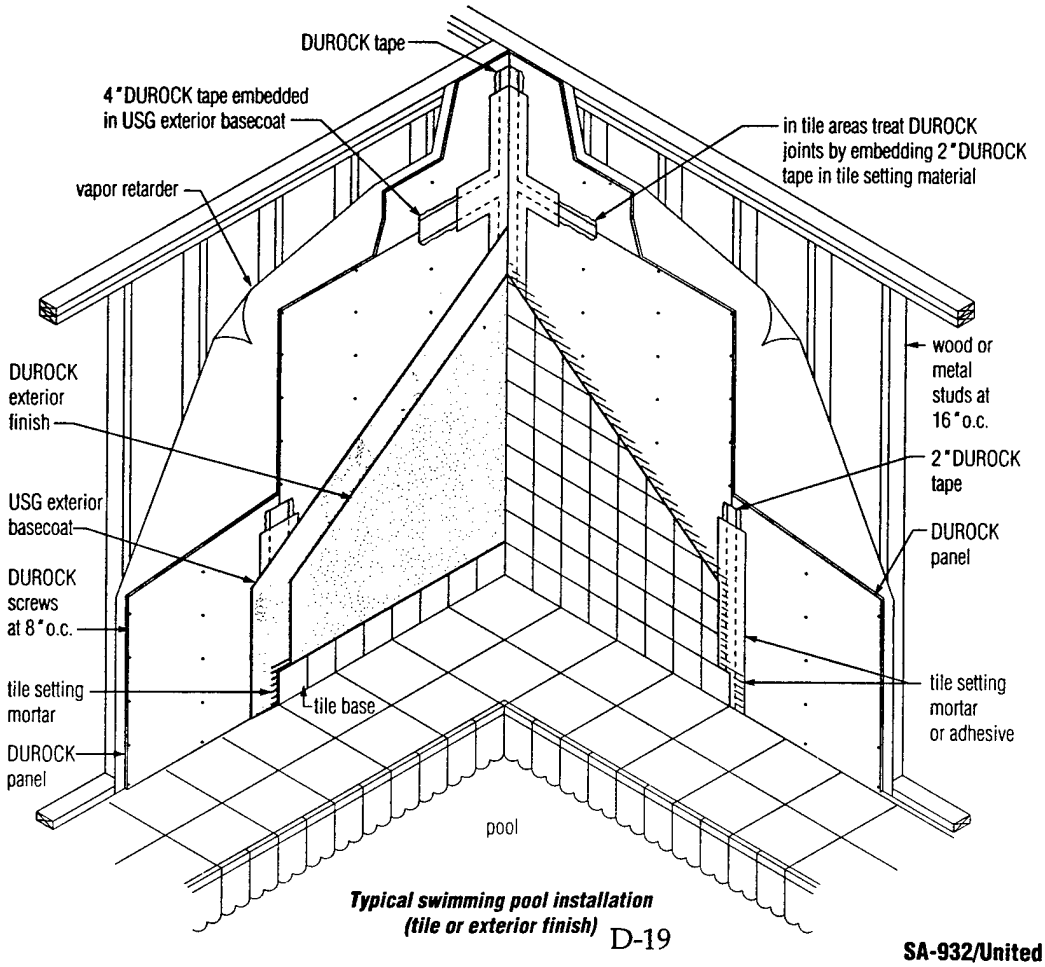


Typical bathtub installation

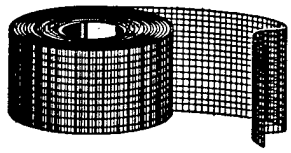
Fixture attachment - steel framing



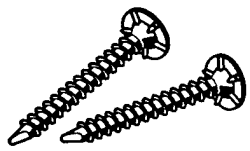




Typical swimming pool installation (tile or exterior finish)



DUROCK tape



DUROCK wood screws



DUROCK steel screws

EMC ENGINEERS, INC.

RECORD OF VERBAL QUOTATION

2750 South Wadsworth Blvd. Suite C-200
Denver, Colorado 80227-3400
303/988-2951 Fax: 303/985-2527

DATE: **29 January 1996**

COMPANY: **Missouri Drywall**

ADDRESS: **St. Louis, Missouri**

PHONE NO.: **1-314-731-2282**

PERSON CONTACTED: **Len**

PROJECT: **Limited Energy Study, Insulate Brick Buildings**

LOCATION: **Fort Leonard Wood, Mo.**

Quotation Received By: **Alan Niemeyer**

DUROCK Cement Board:

1/2" - 4' x 8' sheet @ $25.28

5/8" - 4' x 8' sheet @ $28.96

Shipping Cost is based on one man delivering 4,000 SF of DUROCK (125 sheets).
- Shipping cost per SF = $0.05

Shipping Cost: $200.00 (F.O.B.)

1/96

ANNUAL ENERGY SAVINGS SUMMARY
FOR BRANCH PXs - BUILDINGS 639, 744, 835, & 1026

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Baseline Annual Electric (MBtu)	ECO 1 - Annual Electric (MBtu)	Annual Electric Energy Savings (MBtu)	Baseline Peak Electric Demand (kW)	ECO 1 - Peak Electric Demand (kW)	Peak Electric Demand Savings (kW)	Baseline Nat. Gas Energy Savings (MBtu)	ECO 1 - Annual Nat. Gas (MBtu)	Annual Nat. Gas Energy Savings (MBtu)
639	69.66	61.40	8.26	33.80	32.50	1.30	610.49	561.38	49.11

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 639 (SF)	Square Foot Adjust-ment Factor	Annual Electric Energy Savings (MBtu)	Adjusted Annual Electric Energy Savings* (MBtu)	Peak Electric Demand Savings (kW)	Adjusted Peak Electric Demand Savings* (kW)	Annual Nat. Gas Energy Savings (MBtu)	Adjusted Annual Nat. Gas Energy Savings* (MBtu)
744	6,240	5,413	1.153	8.26	9.52	1.30	1.50	49.11	56.61
835	6,240	5,413	1.153	8.26	9.52	1.30	1.50	49.11	56.61
1026	No Evaluation Performed on this Building								

*Energy savings prorated on a square foot basis

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Baseline Annual Electric (MBtu)	ECO 2 - Annual Electric (MBtu)	Annual Electric Energy Savings (MBtu)	Baseline Peak Electric Demand (kW)	ECO 2 - Peak Electric Demand (kW)	Peak Electric Demand Savings (kW)	Baseline Annual Nat. Gas (MBtu)	ECO 2 - Annual Nat. Gas (MBtu)	Annual Nat. Gas Energy Savings (MBtu)
639	69.66	60.75	8.91	33.80	32.50	1.30	610.49	558.44	52.05

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 639 (SF)	Square Foot Adjust-ment Factor	Annual Electric Energy Savings (MBtu)	Adjusted Annual Electric Energy Savings* (MBtu)	Peak Electric Demand Savings (kW)	Adjusted Peak Electric Demand Savings* (kW)	Annual Nat. Gas Energy Savings (MBtu)	Adjusted Annual Nat. Gas Energy Savings* (MBtu)
744	6,240	5,413	1.153	8.91	10.27	1.30	1.50	52.05	60.00
835	6,240	5,413	1.153	8.91	10.27	1.30	1.50	52.05	60.00
1026	No Evaluation Performed on this Building								

*Energy savings prorated on a square foot basis

INVESTMENT COST SUMMARY
FOR BRANCH PXs - BUILDINGS 639, 744, 835, & 1026

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Investment Cost ($)
639	$22,547

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 639 (SF)	Square Foot Adjust-ment Factor	Investment Cost ($)	Adjusted Investment Cost ($)*
744	6,240	-	-	$29,219	-
835	6,240	5,413	1.153	$22,547	$25,992
1026	8,533	N/A	N/A	N/A	N/A

*Investment Cost prorated on a square foot basis

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Investment Cost ($)
639	$24,302

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 639 (SF)	Square Foot Adjust-ment Factor	Investment Cost ($)	Adjusted Investment Cost ($)*
744	6,240	-	-	$30,958	-
835	6,240	5,413	1.153	$24,302	$28,015
1026	8,533	N/A	N/A	N/A	N/A

*Investment Cost prorated on a square foot basis

LIFE CYCLE COST ANALYSIS SUMMARY

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Leonard Wood	REGION: 2 (Missouri)		PROJECT NO:	1406-011
PROJECT TITLE:	Limited Energy Study, Insulate Brick Buildings			FISCAL YEAR:	1996
ANALYSIS DATE:	02/18/96	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz

1. INVESTMENT: **BLDG 639 - INSTALL 3.5" FIBERGLASS BATT INSULATION ON WALLS**

A.	CONSTRUCTION COST	=	$19,953	
B.	SIOH COST	(7.0% of 1A) =	$1,397	
C.	DESIGN COST	(6.0% of 1A) =	$1,197	
D.	TOTAL COST	(1A +1B +1C) =	$22,547	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT	=	$0	
F.	PUBLIC UTILITY COMPANY REBATE	=	$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$22,547

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96

	ENERGY SOURCE	FUEL COS $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$7.33	8.26	$61	13.80	$835	
B.	DIST	$0.00	0	$0	0.00	$0	
C.	NAT GAS	$5.30	49.11	$260	17.76	$4,623	
D.	COAL	$0.00	0	$0	0.00	$0	
E.	ELEC. DEMAND			$96	13.47	$1,300	
F.	TOTAL		57.37	$417		-------->	$6,757

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1	ANNUAL MAINTENANCE	$0	$0
2		$0	$0
3		$0	$0
4	TOTAL ANNUAL DISC. SAVINGS (+) / COST	$0	$0

B. NON-RECURRING (+/-)

ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)
a. BASELINE EQUIP. REPLCMNT.				$0
b.				$0
c.				$0
d.				$0
e.				$0
f. TOTAL	$0			$0

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = $0

4.	FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-)	(2F3+3A4+(3Bf1/Economic Life))	$417
5.	SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY)	(1G/4) =	54.03
6.	TOTAL NET DISCOUNTED SAVINGS	(2F5 + 3C) =	$6,757
7.	DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (MUST HAVE SIR > 1.25 TO QUALIFY)	(6/1G) =	0.30

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	SHEET 1 OF 1	
ENGINEER	E M C Engineers, Inc.	DATE PREPARED	18-Feb-96
	Denver, CO	ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST			LABOR COST			TOTAL
				Quantity	Unit Cost	Total	Crew/ Worker	Hours/ Unit	Total	
1		**BUILDING 639**								
2		**INSTALL 3.5" BATT INSULATION ON WALLS**								
3										
4										
5	I3-1/2I	INSTALL 3-1/2" BATT INSULATION	S.F.	3662.0	$0.18	$664	1-CARP	0.007	$673	$1,337
6	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	3515.0	$0.20	$704	2-CARP	0.017	$3,140	$3,844
7	ISW	INSTALL 2"x4" STUDDED WALL 2' OC	L.F.	2255.0	$0.24	$531	F-2	0.009	$1,118	$1,650
8	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	3662.0	$0.07	$245	1-PORD	0.01	$884	$1,128
9	R25CS	RELOCATE 24'x8'x2' CLOTHING SHELVES	EA.	1.0	$0.00	$0	1-SSWK	2.46	$71	$71
10	R30CS	RELOCATE 30'x8'x2' CLOTHING SHELVES	EA.	1.0	$0.00	$0	1-SSWK	2.705	$78	$78
11	RFCU	RELOCATE FAN COIL UNIT	EA.	2.0	$20.30	$41	Q-6	5.67	$992	$1,033
12	REES	RELOCATE ELECTRICAL EXIT SIGN	EA.	1.0	$0.00	$0	1-ELEC	1.5	$46	$46
13	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	2.0	$8.82	$18	1-ELEC	0.844	$51	$69
14	REO	RELOCATE ELECTRICAL OUTLET	EA.	10.0	$7.97	$80	1-ELEC	0.896	$273	$352
15	RFAPB	RELOCATE FIRE ALARM PULL BOX	EA.	1.0	$0.00	$0	1-ELEC	1.6	$49	$49
16	RWHD	RELOCATE WALL HAND DRYER	EA.	1.0	$0.00	$0	1-CARP	3.2	$84	$84
17	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	L.F.	309.0	$1.14	$354	1-CARP	0.134	$1,088	$1,442
18	RRG	RELOCATE RETURN AIR GRILLE	EA.	1.0	$0.00	$0	1-SHEE	4	$120	$120
19	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	147.0	$0.84	$123	2-CARP	0.02	$154	$278
20	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	147.0	$1.83	$269	2-TILE	0.084	$598	$867
21										
22										
23										
24										
25										
26										
27		**SUBTOTAL**				$3,028			$9,420	$12,449
28	DIFF	DIFFICULTLY FACTOR			5%				$471	$471
29		**SUBTOTAL**				$3,028			$9,891	$12,920
30	OH	OVERHEAD			17%	$515			$1,682	$2,196
31		**SUBTOTAL**				$3,543			$11,573	$15,116
32	PRO	PROFIT			10%	$354			$1,157	$1,512
33		**SUBTOTAL**				$3,897			$12,730	$16,628
34	CONT	CONTINGENCY			20%	$779			$2,546	$3,326
35	**TOTAL COST**					$4,677			$15,276	$19,953

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	SHEET 1	OF 1
ENGINEER	E M C Engineers, Inc.	DATE PREPARED	18-Feb-96
	Denver, CO	ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST Quantity	Unit Cost	Total	LABOR COST Crew/ Worker	Hours/ Unit	Total	TOTAL
1		**BUILDING 744**								
2		**INSTALL 3.5" BATT INSULATION ON WALLS**								
3										
4										
5	I3-1/2I	INSTALL 3-1/2" BATT INSULATION	S.F.	3662.0	$0.18	$664	1-CARP	0.007	$673	$1,337
6	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	3515.0	$0.20	$704	2-CARP	0.017	$3,140	$3,844
7	ISW	INSTALL 2"x4" STUDDED WALL 2' OC	L.F.	2255.0	$0.24	$531	F-2	0.009	$1,118	$1,650
8	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	3662.0	$0.07	$245	1-PORD	0.01	$884	$1,128
9	R25CS	RELOCATE 24'x8'x2' CLOTHING SHELVES	EA.	1.0	$0.00	$0	1-SSWK	2.46	$71	$71
10	R30CS	RELOCATE 30'x8'x2' CLOTHING SHELVES	EA.	1.0	$0.00	$0	1-SSWK	2.705	$78	$78
11	RFCU	RELOCATE FAN COIL UNIT	EA.	2.0	$20.30	$41	Q-6	5.67	$992	$1,033
12	REES	RELOCATE ELECTRICAL EXIT SIGN	EA.	1.0	$0.00	$0	1-ELEC	1.5	$46	$46
13	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	2.0	$8.82	$18	1-ELEC	0.844	$51	$69
14	REO	RELOCATE ELECTRICAL OUTLET	EA.	10.0	$7.97	$80	1-ELEC	0.896	$273	$352
15	RFAPB	RELOCATE FIRE ALARM PULL BOX	EA.	1.0	$0.00	$0	1-ELEC	1.6	$49	$49
16	RWHD	RELOCATE WALL HAND DRYER	EA.	1.0	$0.00	$0	1-CARP	3.2	$84	$84
17	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	L.F.	309.0	$1.14	$354	1-CARP	0.134	$1,088	$1,442
18	RRG	RELOCATE RETURN AIR GRILLE	EA.	1.0	$0.00	$0	1-SHEE	4	$120	$120
19	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	147.0	$0.84	$123	2-CARP	0.02	$154	$278
20	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	147.0	$1.83	$269	2-TILE	0.084	$598	$867
21	RTB	RELOCATE 8 TELEPHONE BOOTHS	EA.	1.0	$0.00	$0	3-CARP	48	$3,783	$3,783
22										
23										
24		**SUBTOTAL**				$3,028			$13,204	$16,232
25	DIFF	DIFFICULTLY FACTOR			5%				$660	$660
26		**SUBTOTAL**				$3,028			$13,864	$16,892
27	OH	OVERHEAD			17%	$515			$2,357	$2,872
28		**SUBTOTAL**				$3,543			$16,221	$19,764
29	PRO	PROFIT			10%	$354			$1,622	$1,976
30		**SUBTOTAL**				$3,897			$17,843	$21,740
31	CONT	CONTINGENCY			20%	$779			$3,569	$4,348
32	**TOTAL COST**					$4,677			$21,411	$26,088
33	SIOH COST				6%	$281			$1,285	$1,565
34	DESIGN COST				6%	$281			$1,285	$1,565
35	**TOTAL INVESTMENT**					$5,238			$23,981	$29,219

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Leonard Wood	REGION: 2 (Missouri)		PROJECT NO:	1406-011
PROJECT TITLE:	Limited Energy Study, Insulate Brick Buildings			FISCAL YEAR:	1996
ANALYSIS DATE:	02/18/96	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz

1. INVESTMENT: **BLDG 639 - INSTALL 1.5" RIGID INSULATION ON WALLS**

A.	CONSTRUCTION COST	=	$21,506	
B.	SIOH COST	(7.0% of 1A) =	$1,505	
C.	DESIGN COST	(6.0% of 1A) =	$1,290	
D.	TOTAL COST	(1A +1B +1C) =	$24,302	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT	=	$0	
F.	PUBLIC UTILITY COMPANY REBATE	=	$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$24,302

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96

	ENERGY SOURCE	FUEL COS $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$7.33	8.91	$65	13.80	$901	
B.	DIST	$0.00	0	$0	0.00	$0	
C.	NAT GAS	$5.30	52.05	$276	17.76	$4,899	
D.	COAL	$0.00	0	$0	0.00	$0	
E.	ELEC. DEMAND			$96	13.47	$1,300	
F.	TOTAL		60.96	$438		-------->	$7,100

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1	ANNUAL MAINTENANCE	$0	$0
2		$0	$0
3		$0	$0
4	TOTAL ANNUAL DISC. SAVINGS (+) / COST	$0	$0

B. NON-RECURRING (+/-)

	ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)	
a.	BASELINE EQUIP. REPLCMNT.				$0	
b.					$0	
c.					$0	
d.					$0	
e.					$0	
f.	TOTAL	$0			$0	

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = $0

4.	FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-)	(2F3+3A4+(3Bf1/Economic Life))	$438
5.	SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY)	(1G/4) =	55.53
6.	TOTAL NET DISCOUNTED SAVINGS	(2F5 + 3C) =	$7,100
7.	DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (MUST HAVE SIR > 1.25 TO QUALIFY)	(6/1G) =	0.29

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	SHEET 1 OF 1	
ENGINEER	E M C Engineers, Inc.	DATE PREPARED	18-Feb-96
	Denver, CO	ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST Quantity	Unit Cost	Total	LABOR COST Crew/ Worker	Hours/ Unit	Total	TOTAL
1		**BUILDING 639**								
2		**INSTALL 1.5" RIGID INSULATION ON WALLS**								
3										
4										
5	I1-1/2RI	INSTALL 1-1/2" RIGID INSULATION	S.F.	3662.0	$0.59	$2,166	1-CARP	0.008	$770	$2,936
6	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	3515.0	$0.20	$704	2-CARP	0.017	$3,140	$3,844
7	IFS	INSTALL 3/4"x2" FURRING STRIPS	L.F.	1753.0	$0.19	$334	1-CARP	0.016	$737	$1,071
8	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	3662.0	$0.07	$245	1-PORD	0.01	$884	$1,128
9	R25CS	RELOCATE 24'x8'x2' CLOTHING SHELVES	EA.	1.0	$0.00	$0	1-SSWK	2.46	$71	$71
10	R30CS	RELOCATE 30'x8'x2' CLOTHING SHELVES	EA.	1.0	$0.00	$0	1-SSWK	2.705	$78	$78
11	RFCU	RELOCATE FAN COIL UNIT	EA.	2.0	$20.30	$41	Q-6	5.67	$992	$1,033
12	REES	RELOCATE ELECTRICAL EXIT SIGN	EA.	1.0	$0.00	$0	1-ELEC	1.5	$46	$46
13	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	2.0	$8.82	$18	1-ELEC	0.844	$51	$69
14	REO	RELOCATE ELECTRICAL OUTLET	EA.	10.0	$7.97	$80	1-ELEC	0.896	$273	$352
15	RFAPB	RELOCATE FIRE ALARM PULL BOX	EA.	1.0	$0.00	$0	1-ELEC	1.6	$49	$49
16	RWHD	RELOCATE WALL HAND DRYER	EA.	1.0	$0.00	$0	1-CARP	3.2	$84	$84
17	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	L.F.	309.0	$1.14	$354	1-CARP	0.134	$1,088	$1,442
18	RRG	RELOCATE RETURN AIR GRILLE	EA.	1.0	$0.00	$0	1-SHEE	4	$120	$120
19	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	147.0	$0.84	$123	2-CARP	0.02	$154	$278
20	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	147.0	$1.83	$269	2-TILE	0.084	$598	$867
21										
22										
23										
24										
25										
26										
27		**SUBTOTAL**				$4,334			$9,135	$13,469
28	DIFF	DIFFICULTLY FACTOR			5%				$457	$457
29		**SUBTOTAL**				$4,334			$9,592	$13,925
30	OH	OVERHEAD			17%	$737			$1,631	$2,367
31		**SUBTOTAL**				$5,070			$11,222	$16,293
32	PRO	PROFIT			10%	$507			$1,122	$1,629
33		**SUBTOTAL**				$5,577			$12,345	$17,922
34	CONT	CONTINGENCY			20%	$1,115			$2,469	$3,584
35	**TOTAL COST**					$6,693			$14,813	$21,506

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	**SHEET** 1	**OF** 1
ENGINEER	E M C Engineers, Inc.	**DATE PREPARED**	18-Feb-96
	Denver, CO	**ESTIMATOR**	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST Quantity	Unit Cost	Total	LABOR COST Crew/ Worker	Hours/ Unit	Total	TOTAL
1		**BUILDING 744**								
2		**INSTALL 1.5" RIGID INSULATION ON WALLS**								
3										
4										
5	I1-1/2RI	INSTALL 1-1/2" RIGID INSULATION	S.F.	3662.0	$0.59	$2,166	1-CARP	0.008	$770	$2,936
6	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	3515.0	$0.20	$704	2-CARP	0.017	$3,140	$3,844
7	IFS	INSTALL 3/4"x2" FURRING STRIPS	L.F.	1753.0	$0.19	$334	1-CARP	0.016	$737	$1,071
8	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	3662.0	$0.07	$245	1-PORD	0.01	$884	$1,128
9	R25CS	RELOCATE 24'x8'x2' CLOTHING SHELVES	EA.	1.0	$0.00	$0	1-SSWK	2.46	$71	$71
10	R30CS	RELOCATE 30'x8'x2' CLOTHING SHELVES	EA.	1.0	$0.00	$0	1-SSWK	2.705	$78	$78
11	RFCU	RELOCATE FAN COIL UNIT	EA.	2.0	$20.30	$41	Q-6	5.67	$992	$1,033
12	REES	RELOCATE ELECTRICAL EXIT SIGN	EA.	1.0	$0.00	$0	1-ELEC	1.5	$46	$46
13	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	2.0	$8.82	$18	1-ELEC	0.844	$51	$69
14	REO	RELOCATE ELECTRICAL OUTLET	EA.	10.0	$7.97	$80	1-ELEC	0.896	$273	$352
15	RFAPB	RELOCATE FIRE ALARM PULL BOX	EA.	1.0	$0.00	$0	1-ELEC	1.6	$49	$49
16	RWHD	RELOCATE WALL HAND DRYER	EA.	1.0	$0.00	$0	1-CARP	3.2	$84	$84
17	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	L.F.	309.0	$1.14	$354	1-CARP	0.134	$1,088	$1,442
18	RRG	RELOCATE RETURN AIR GRILLE	EA.	1.0	$0.00	$0	1-SHEE	4	$120	$120
19	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	147.0	$0.84	$123	2-CARP	0.02	$154	$278
20	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	147.0	$1.83	$269	2-TILE	0.084	$598	$867
21	RTB	RELOCATE 8 TELEPHONE BOOTHS	EA.	1.0	$0.00	$0	3-CARP	48	$3,783	$3,783
22										
23										
24		**SUBTOTAL**				$4,334			$12,918	$17,252
25	DIFF	DIFFICULTLY FACTOR			5%				$646	$646
26		**SUBTOTAL**				$4,334			$13,564	$17,898
27	OH	OVERHEAD			17%	$737			$2,306	$3,043
28		**SUBTOTAL**				$5,070			$15,870	$20,940
29	PRO	PROFIT			10%	$507			$1,587	$2,094
30		**SUBTOTAL**				$5,577			$17,457	$23,034
31	CONT	CONTINGENCY			20%	$1,115			$3,491	$4,607
32	**TOTAL COST**					$6,693			$20,949	$27,641
33	SIOH COST				6%	$402			$1,257	$1,658
34	DESIGN COST				6%	$402			$1,257	$1,658
35	**TOTAL INVESTMENT**					$7,496			$23,462	$30,958

E M C ENGINEERS, INC.

DATE:	Feb-96
BY:	DMS
JOB:	1406.011
CHK:	AJN
FILE:	639Z1BHL

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT LEONARD WOOD, MO.

BUILDING HEATING LOAD CALCULATION SHEET

BLDG NO:	639A	BLDG NAME:	POST EXCHANGE - ZONE 1
BLDG FUNCTION:	STORE AND SNACK BAR		
FLOOR AREA: (SQ. FT)	3,706	# FLOORS	1
SLAB PERIMETER: (FT)	192		

I. AREAS: ([ ] FIELD VERIFIED ELEVATION PLANS)

		NORTH	SOUTH	EAST	WEST	TOTAL
WALLS, GROSS	(SQ. FT)	851	207	1,150	665	2,873
GLASS	(SQ. FT)	0	0	107	0	107
PERSONNEL DOOR	(SQ. FT)	0	0	49	123	172
INSULATED PANEL	(SQ. FT)	0	0	53	0	53
WALLS, NET	(SQ. FT)	851	207	941	542	2,541
ROOF AREA (OR CEILING AREA IF ATTIC IS UNCONDITIONED)					(SQ. FT)	4,011
INSULATED PANEL	(SQ. FT)	53	PERSONNEL DOOR		(SQ. FT)	172
BASEMENT WALLS	(SQ. FT)	0	0	0	0	0

II. CONSTRUCTION: ([ ] FIELD VERIFIED WALL, ROOF, WINDOW, DOOR TYPES)

WALLS: (SKETCH CROSS SECTION OF WALL)		COMPONENTS	R-VALUE
	1.	OUTSIDE AIR FILM	0.17
	2.	4" FACE BRICK	0.43
	3.	AIR SPACE	0.91
	4.	6" CMU	1.89
	5.		
	6.		
	7.	INSIDE AIR FILM	0.68
		TOTAL R-WALL =	4.08
		U = 1/R	0.245

ROOF: (SKETCH CROSS SECTION OF ROOF)		COMPONENTS	R-VALUE
	1.	OUTSIDE AIR FILM	0.17
	2.	BUILT UP ROOF	0.34
	3.	1.5" INSULATION	6.00
	4.	CEILING AIR SPACE	1.00
	5.	6" FB BATT INSUL	19.00
	6.	ACOUSTIC TILE	1.35
	7.	INSIDE AIR FILM	0.68
		TOTAL R-ROOF =	28.54
		U = 1/R	0.035

GLASS TYPE:	PPG 'PENNVERNON' C.L. TWNDV, SSA, .88 S.C.	R-GLASS	1.61
SLAB TYPE FLOOR:	CEMENT	SLF	0.83
BASEMENT TYPE:	NONE	R-BASEM.	0.00
INSULATED PANEL:		R-PANEL	4.20
PERSONNEL DOOR TYPE:	METAL	R-PDOOR	2.56

III. INFILTRATION:

TIGHT WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
AVG. WALL H/M/L (SQ.FT.)	M	2873	X CFM / SQ.FT.	0.115	=	330
LEAKY WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
DOOR OPENINGS / HR - SINGLE DOOR			X CFM /OPENING /HR	1.600	=	0
DOOR OPENINGS / HR - DOUBLE DOORS		20	X CFM /OPENING /HR	1.385	=	28
			TOTAL INFILTRATION (CFM)		=	358

UA PANEL	PANEL AREA	53	X PANEL "U"	0.238	=	13
UA PDOOR	PDOOR AREA	172	X DOOR "U"	0.391	=	67
UA WALL	WALL AREA	2,488	X WALL "U"	0.245	=	622
UA ROOF	ROOF AREA	4,011	X ROOF "U"	0.035	=	141
UA GLASS	GLASS AREA	107	X GLASS "U"	0.621	=	66
UA SLAB	SLAB PERIM.	192	X SLF	0.830	=	159
UA BASEM.	B-WALL AREA	0	X BASE. "U"	0.000	=	0
INFILTRATION	CFM	358	X A. T. F.	1.035	=	371
			TOTAL UA (BTU/HR°F)			1,439

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT LEONARD WOOD, MO.

DATE: Feb-96
BY: DMS
JOB: 1406.011
CHK: AJN
FILE: 639Z2BHL

BUILDING HEATING LOAD CALCULATION SHEET

BLDG NO: 639B BLDG NAME: POST EXCHANGE - ZONE 2
BLDG FUNCTION: GAME ROOM
FLOOR AREA: (SQ. FT) 1,046 # FLOORS 1
SLAB PERIMETER: (FT) 92

I. AREAS: ([ ] FIELD VERIFIED ELEVATION PLANS)

		NORTH	SOUTH	EAST	WEST	TOTAL
WALLS, GROSS	(SQ. FT)	0	581	315	248	1,144
GLASS	(SQ. FT)	0	0	27	0	27
PERSONNEL DOOR	(SQ. FT)	0	0	49	0	49
OVERHEAD DOOR	(SQ. FT)	0	0	0	0	0
WALLS, NET	(SQ. FT)	0	581	239	248	1,068
ROOF AREA (OR CEILING AREA IF ATTIC IS UNCONDITIONED)					(SQ. FT)	1,046
OVERHEAD DOOR	(SQ. FT)	0	PERSONNEL DOOR		(SQ. FT)	49
BASEMENT WALLS	(SQ. FT)	0	0	0	0	0

II. CONSTRUCTION: ([ ] FIELD VERIFIED WALL, ROOF, WINDOW, DOOR TYPES)

WALLS: (SKETCH CROSS SECTION OF WALL)

	COMPONENTS	R-VALUE
1.	OUTSIDE AIR FILM	0.17
2.	4"BRICK/METAL PANAL	0.19
3.	AIR SPACE	0.91
4.	1.5" INSULATION	4.98
5.	6" CMU	1.89
6.		
7.	INSIDE AIR FILM	0.68
	TOTAL R-WALL =	8.82
	U = 1/R	0.113

ROOF: (SKETCH CROSS SECTION OF ROOF)

	COMPONENTS	R-VALUE
1.	OUTSIDE AIR FILM	0.17
2.	BUILT UP ROOF	0.34
3.	1.5" INSULATION	6.00
4.	CEILING AIR SPACE	1.00
5.	6" FB BATT INSUL	19.00
6.	ACOUSTIC TILE	1.35
7.	INSIDE AIR FILM	0.68
	TOTAL R-ROOF =	28.54
	U = 1/R	0.035

GLASS TYPE:	PPG 'PENNVERNON' C.L. TWNDV, SSA, .88 S.C.	R-GLASS	1.61
SLAB TYPE FLOOR:	CEMENT	SLF	0.83
BASEMENT TYPE:	NONE	R-BASEM.	0.00
OVERHEAD DOOR TYPE:	NONE	R-ODOOR	0.00
PERSONNEL DOOR TYPE:	METAL	R-PDOOR	2.56

III. INFILTRATION:

TIGHT WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
AVG. WALL H/M/L (SQ.FT.)	L	1144	X CFM / SQ.FT.	0.092	=	105
LEAKY WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
DOOR OPENINGS / HR - SINGLE DOOR			X CFM /OPENING /HR	1.600	=	0
DOOR OPENINGS / HR - DOUBLE DOORS		10	X CFM /OPENING /HR	1.385	=	14
			TOTAL INFILTRATION (CFM)		=	119

UA ODOOR	ODOOR AREA	0	X DOOR "U"	0.000	=	0
UA PDOOR	PDOOR AREA	49	X DOOR "U"	0.391	=	19
UA WALL	WALL AREA	1,068	X WALL "U"	0.113	=	121
UA ROOF	ROOF AREA	1,046	X ROOF "U"	0.035	=	37
UA GLASS	GLASS AREA	27	X GLASS "U"	0.621	=	17
UA SLAB	SLAB PERIM.	92	X SLF	0.830	=	76
UA BASEM.	B-WALL AREA	0	X BASE. "U"	0.000	=	0
INFILTRATION	CFM	119	X A. T. F.	1.035	=	123
			TOTAL UA (BTU/HR°F)			393

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED B DMS
CHECKED BY: AJN
FILE: 639AZ1
BLDG: 639A ZONE: 1

Rates of Heat Gain from Occupants of Conditioned Spaces

Zone No.	No. of People	Activity Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)
1	10	4	Seated, light work, typing	Offices, hotels, apts	250	200	2,500	2,000
	6	5	Standing, light work, or walking slowly	Retail store, bank	270	220	1,620	1,320
	20	3	Seated Eating	Restaurant	225	325	4,500	6,500
TOTAL	36					TOTAL	8,620	9,820

Peak Wattage Value for Lights

Zone No.	No. of Fixtures	Fixture Type	Description	Watts/Fixture	Total Wattage
1	39	8	Fluorescent, 4 - 34w lamps, 2 - 16w ballasts (2x4 ft. fix.)	168	6,552
	3	6	Fluorescent, 2 - 34w lamps, 16w ballast (2x4 ft. fixture)	84	252
	27	18	Incandescent - 60w	60	1,620
	0	0	0	0	0
			0	0	0
			0	0	0
			0	0	0
		0	0	0	0
TOTAL	69			TOTAL	8,424

Peak Value for Internal Gains

Zone No.	No. of Equip.	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattage	Total (BTU)
1	1	46	Microwave Oven	600	65%	600	2,048
	2	21	Cash Register	60	20%	120	410
	5	53	Refrigerator (12 cu. ft.)	241	20%	1,205	4,113
				TOTAL	49%	1,325	4,522

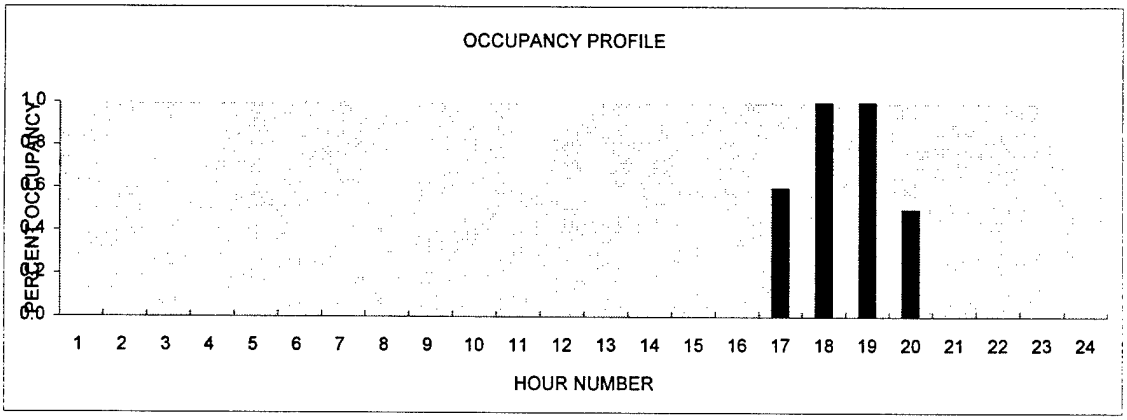
V:\1406.011\COLECTD\FIELD\PLE\639Z1.XLS

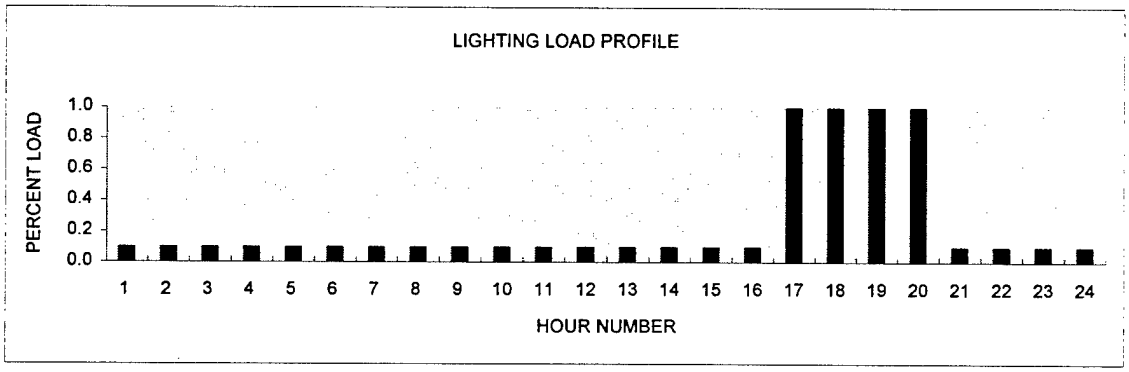
E M C Engineers, Inc.

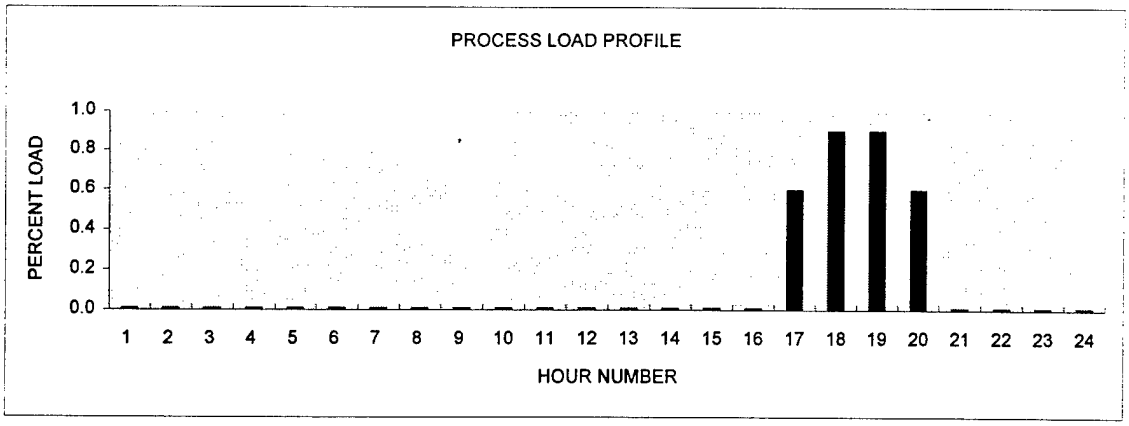
PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94-D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 639AZ1
BLDG: 639A
ZONE: 1

BLDG TYPE	BLDG FUNCTION	TYPE OF PROFILE	HOUR NUMBER																							
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
4	Post Exchan	OCCUPANC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.0	1.0	0.5	0.0	0.0	0.0	0.0
		LIGHTING	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.0	1.0	1.0	1.0	0.1	0.1	0.1	0.1
		PROCESS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.9	0.9	0.6	0.0	0.0	0.0	0.0







V:\1406.011\COLECTD\FIELD\PLE\639Z1.XLS

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY DMS
CHECKED BY: AJN
FILE: 639Z2
BLDG: 639 ZONE: 2

Rates of Heat Gain from Occupants of Conditioned Spaces

Zone No.	No. of People	Activity Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)
2	10	5	Standing, light work, or walking slowly	Retail store, bank	270	220	2,700	2,200
TOTA	10					TOTAL	2,700	2,200

Peak Wattage Value for Lights

Zone No.	No. of Fixtures	Fixture Type	Description	Watts/Fixture	Total Wattage
2	2	8	Fluorescent, 4 - 34w lamps, 2 - 16w ballasts (2x4 ft. fix.)	168	336
	32	18	Incandescent - 60w	60	1,920
TOTA	34			TOTAL	2,256

Peak Value for Internal Gains

Zone No.	No. of Equipment	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattage	Total (BTU)
2	9	62	Video Games	300	15%	2,700	9,215
				TOTAL	15%	2,700	9,215

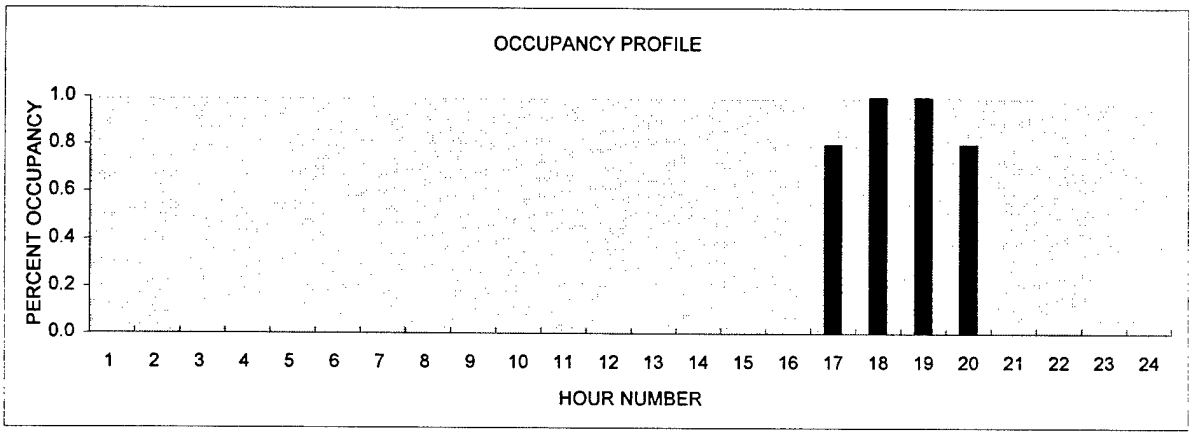
V:\1406.011\COLECTD\FIELD\PLE\639Z2.XLS

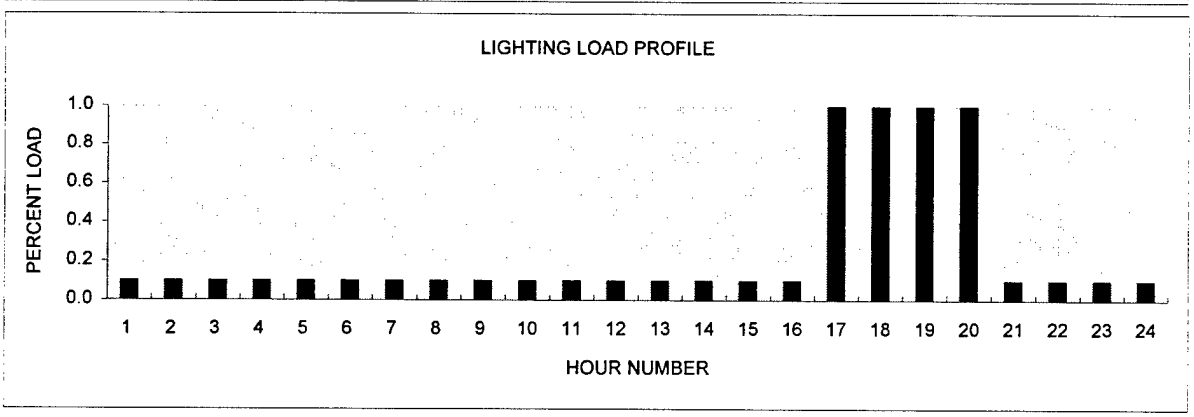
E M C Engineers, Inc.

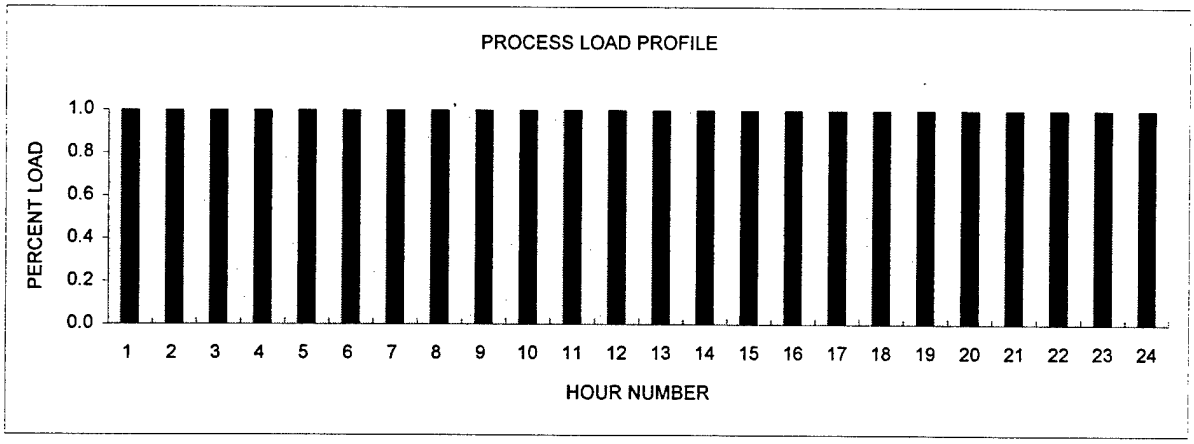
PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: ########
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 639Z2
BLDG: 639
ZONE: 2

BLDG TYPE	BLDG FUNCTION	TYPE OF PROFILE	HOUR NUMBER																							
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
4	Post Exchan	OCCUPANC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.0	1.0	0.8	0.0	0.0	0.0	0.0
		LIGHTING	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.0	1.0	1.0	1.0	0.1	0.1	0.1
		PROCESS	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0







V:\1406.011\COLECTD\FIELD\PLE\639Z2.XLS

```
BLDG 639 - Post Exchange - Store/ Snack Bar - Zone 1   BASELINE
----------  PROGRAM CONTROL OPTIONS -----------
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)            1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)            0
WEEKEND INTERNAL GAINS FACTOR (WKEND)         1.375000
LAST CASE FLAG (1=YES, 0=NO)  (LSTCS)             1
SKY CLEARNESS FACTOR (CLN)         1.000000
NUMBER OF ZONES (NZ)            1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)            0
--------- SITE AND BUILDING DATA --------------
******REAL WEATHER FROM DISK*******
 FILE NAME mo
STATION 13995   YEAR 1955
SITE LATITUDE DEG (AL1)        37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)      1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)        56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN)        20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA)     6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF)     3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG)     2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO)        70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)        70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS)     9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW)     0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS)     34650.820000
FLOOR AREA (SQFT)      3706.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX)    325000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX)   -245500.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA)     37060.000000
CONSTANT INFILTRATION RATE CFM (CFMI)       358.000000
INFILTRATION PROFILE
 .930       .930       .930       .930       .930       .930       .930       .930
 .930       .930       .930       .930       .930       .930       .930       .930
1.00       1.00       1.00       1.00       .930       .930       .930       .930
A FACTOR IN INFILTRATION EQUATION (CINA)     6.200000E-01
B FACTOR IN INFILTRATION EQUATION (CINB)     2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC)     8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP)      9170.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF)     0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF)       158.900000
PARTITION UA BTU/HR-F (GUA)     0.000000E+00
DOOR UA BTU/HR-F (DUA)        67.000000
WINDOW GLASS NUMBER (NG)           30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO)     6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN)     6.930472E-01
WINDOW SHADING FACTOR (SHD)     6.200000E-01


                                WALL DATA
WALL NUMBER                      1          2          3          4
AZIMUTH ANGLE (AZ)                .00      90.00     180.00     -90.00
WALL AREA SQFT (AWLL)           207.0      542.0      851.0      994.0
WINDOW AREA SQFT (AWND)           .0         .0         .0      107.0
WINDOW HEIGHT FT (WNDH)         10.0       10.0       10.0       10.0
WINDOW WIDTH FT (WNDW)            .0         .0         .0       10.7
WIDTH OF OVERHANG (WOH)           .0         .0         .0         .0
OVERHANG HGT ABV WNDW(HOH)        .0         .0         .0         .0
```

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.245	.245	.245
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01837	.01837	.01837	.01837
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00003	.00003	.00003	.00003
N=2	.00283	.00283	.00283	.00283
N=3	.01017	.01017	.01017	.01017
N=4	.00498	.00498	.00498	.00498
N=5	.00037	.00037	.00037	.00037
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	-.07415	-.07415	-.07415	-.07415
N=5	.00212	.00212	.00212	.00212
N=6	********	********	********	********

ROOF AREA SQFT (AROF) 4011.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.500000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.861519E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .172E-05 .257E-04 .849E-04 .635E-04 .120E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.900000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	8.	2216.	8620.	9820.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.012	.000	.000	70.0	76.0
2	.100	.012	.000	.000	70.0	76.0
3	.100	.012	.000	.000	70.0	76.0
4	.100	.012	.000	.000	70.0	76.0
5	.100	.012	.000	.000	70.0	76.0
6	.100	.012	.000	.000	70.0	76.0
7	.100	.012	.000	.000	70.0	76.0
8	.100	.012	.000	.000	70.0	76.0

```
  9         .100      .012      .000      .000        70.0        76.0
 10         .100      .012      .000      .000        70.0        76.0
 11         .100      .012      .000      .000        70.0        76.0
 12         .100      .012      .000      .000        70.0        76.0
 13         .100      .012      .000      .000        70.0        76.0
 14         .100      .012      .000      .000        70.0        76.0
 15         .100      .012      .000      .000        70.0        76.0
 16         .100      .012      .000      .000        70.0        76.0
 17        1.000      .600      .600      .600        70.0        76.0
 18        1.000      .900     1.000     1.000        70.0        76.0
 19        1.000      .900     1.000     1.000        70.0        76.0
 20        1.000      .600      .500      .500        70.0        76.0
 21         .100      .012      .000      .000        70.0        76.0
 22         .100      .012      .000      .000        70.0        76.0
 23         .100      .012      .000      .000        70.0        76.0
 24         .100      .012      .000      .000        70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       60.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)     6000.000000
ECONOMIZER HIGH TEMP LIMIT F        65.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       58.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     6.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  330000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   412500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)            3
COOLING PLANT RATED OUTPUT BTU (CFLOT)   245500.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    64704.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 639 - Post Exchange - Store/ Snack Bar - Zone 1 BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	1.35	.00	.00	.00	.01	.00	.00	.00
	-60.64	LOSS		-.73	-5.94	.00	-13.76	-1.48	-49.07	.00
FEB	.00	GAIN	1.84	.00	.00	.00	.03	.00	.00	.00
	-48.64	LOSS		-.60	-5.02	.00	-10.29	-1.26	-41.50	.00
MAR	.58	GAIN	2.30	.00	.00	.00	.55	.00	.02	.14
	-40.65	LOSS		-.53	-4.64	.00	-8.12	-1.16	-37.69	.00
APR	4.14	GAIN	2.42	.00	.04	.00	1.92	.01	.25	.90
	-18.34	LOSS		-.29	-2.67	.00	-3.77	-.67	-21.09	.00
MAY	11.78	GAIN	2.71	.03	.11	.00	3.82	.03	.73	3.96
	-5.06	LOSS		-.13	-1.44	.00	-1.27	-.35	-10.42	.00
JUN	30.77	GAIN	2.74	.06	.29	.00	5.57	.07	1.94	16.67
	-.46	LOSS		-.04	-.68	.00	-.29	-.16	-4.63	.00
JUL	44.80	GAIN	2.83	.12	.70	.00	7.25	.17	4.78	23.34
	-.14	LOSS		-.02	-.42	.00	-.13	-.10	-2.91	.00
AUG	40.89	GAIN	2.44	.09	.53	.00	5.89	.13	3.51	22.93
	-.37	LOSS		-.03	-.48	.00	-.18	-.11	-3.18	.00
SEP	21.58	GAIN	2.10	.03	.28	.00	3.32	.07	1.95	11.79
	-4.96	LOSS		-.12	-1.19	.00	-1.33	-.29	-8.90	.00
OCT	3.72	GAIN	1.66	.00	.05	.00	.90	.01	.35	1.47
	-16.79	LOSS		-.31	-2.52	.00	-4.24	-.61	-18.80	.00
NOV	.45	GAIN	1.24	.00	.00	.00	.18	.00	.02	.16
	-32.30	LOSS		-.47	-3.76	.00	-7.96	-.92	-29.07	.00
DEC	.00	GAIN	1.10	.00	.00	.00	.00	.00	.00	.00
	-59.27	LOSS		-.73	-5.84	.00	-13.96	-1.44	-47.53	.00
TOT	159.	GAIN	25.	0.	2.	0.	29.	0.	14.	81.
	-288.	LOSS		-4.	-35.	0.	-65.	-9.	-275.	0.

MAX HEATING LOAD= -201037. BTUH ON DEC 18 HOUR 7 AMBIENT TEMP -1.
MAX COOLING LOAD= 182271. BTUH ON JUL 28 HOUR 18 AMBIENT TEMP 90.

ZONE UA BTU/HR-F 909.3

BLDG 639 - Post Exchange - Store/ Snack Bar - Zone 1 BASELINE

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	COINCIDENT DAY	HR	AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	76.		4	20	58.	1.72	.50	1.95	8.97
			69.	29	7	14.				
FEB	70.	76.		9	20	63.	1.57	.45	1.76	8.16
			69.	2	7	14.				
MAR	70.	77.		10	19	63.	1.74	.50	1.95	9.05
			69.	4	6	15.				
APR	72.	77.		7	18	71.	1.69	.49	1.89	8.78
			69.	9	6	30.				
MAY	73.	77.		26	18	79.	1.72	.50	1.95	8.97
			70.	11	6	39.				
JUN	75.	77.		30	18	85.	1.69	.49	1.89	8.78
			70.	4	6	66.				
JUL	76.	78.		15	18	92.	1.74	.50	1.95	9.05
			69.	24	7	67.				
AUG	76.	77.		12	19	84.	1.72	.50	1.95	8.97
			70.	25	6	51.				
SEP	74.	77.		2	19	83.	1.71	.49	1.89	8.85
			70.	15	6	39.				
OCT	72.	77.		14	19	71.	1.72	.50	1.95	8.97
			69.	24	7	67.				
NOV	70.	77.		17	19	59.	1.67	.48	1.89	8.70
			68.	14	16	67.				
DEC	70.	77.		29	19	55.	1.76	.51	1.95	9.12
			69.	18	7	-1.				
YEAR							20.42	5.92	22.97	106.36

BLDG 639 - Post Exchange - Store/ Snack Bar - Zone 1 BASELINE

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	734	0	0	0	-.1863E+06	.0000
FEB	634	4	0	0	-.1566E+06	.0000
MAR	637	38	0	0	-.1560E+06	.7819E+05
APR	442	133	0	0	-.9899E+05	.8852E+05
MAY	250	251	0	0	-.6871E+05	.1148E+06
JUN	40	418	0	0	-.2261E+05	.1666E+06
JUL	18	562	0	0	-.1974E+05	.1823E+06
AUG	31	533	0	0	-.3176E+05	.1693E+06
SEP	173	313	0	0	-.6532E+05	.1609E+06
OCT	434	104	0	0	-.9143E+05	.9620E+05
NOV	585	30	0	0	-.1330E+06	.5511E+05
DEC	720	4	0	0	-.2010E+06	.0000
YEAR	4698	2390	0	0	-.2010E+06	.1823E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	99.82	.00	1.72	.50	.57	8.97	12.4
FEB	82.00	.00	1.57	.45	.52	8.16	12.4
MAR	74.41	.07	1.74	.50	.57	9.05	20.6
APR	42.44	.48	1.69	.49	.55	8.78	21.4
MAY	20.45	1.31	1.72	.50	.57	8.97	23.4
JUN	3.14	3.21	1.69	.49	.55	8.78	26.8
JUL	1.41	4.58	1.74	.50	.57	9.05	27.7
AUG	2.44	4.24	1.72	.50	.57	8.97	27.0
SEP	14.54	2.25	1.71	.49	.55	8.85	26.5
OCT	39.99	.42	1.72	.50	.57	8.97	20.8
NOV	63.75	.05	1.67	.48	.55	8.70	15.4
DEC	97.15	.00	1.76	.51	.57	9.12	12.4
YEAR	541.55	16.60	20.42	5.92	6.73	106.36	27.7

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 188017. BTU/(SQFT-YEAR)

BLDG 639 - Post Exchange - Store/ Snack Bar - Zone 1 BASELINE

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.1863E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.1566E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.7819E+05	-.1560E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.8852E+05	-.9899E+05
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1148E+06	-.6871E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.1666E+06	-.2261E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.1823E+06	-.1974E+05
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.1693E+06	-.3176E+05
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.1609E+06	-.6532E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.9620E+05	-.9143E+05
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.5511E+05	-.1330E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2010E+06

BLDG 639 - BRANCH PX STORE (ZONE 1) ECO-1 INSTALL FIBERGLASS INSUL.

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.375000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA --------------

******REAL WEATHER FROM DISK*******

FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 34650.820000
FLOOR AREA (SQFT) 3706.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 325000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -245500.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 37060.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 358.000000
INFILTRATION PROFILE

.930	.930	.930	.930	.930	.930	.930	.930
.930	.930	.930	.930	.930	.930	.930	.930
1.00	1.00	1.00	1.00	.930	.930	.930	.930

A FACTOR IN INFILTRATION EQUATION (CINA) 6.200000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 9170.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 158.900000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 67.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	207.0	542.0	851.0	994.0
WINDOW AREA SQFT (AWND)	.0	.0	.0	107.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	.0	.0	.0	10.7
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.064	.064	.064	.064
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00176	.00176	.00176	.00176
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00016	.00016	.00016	.00016
N=3	.00086	.00086	.00086	.00086
N=4	.00066	.00066	.00066	.00066
N=5	.00008	.00008	.00008	.00008
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	-.16643	-.16643	-.16643	-.16643
N=5	.00728	.00728	.00728	.00728
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 4011.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.500000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.861519E-04
ROOF B TRANSFER FUNCTIONS (BNR)

.000	.172E-05	.257E-04	.849E-04	.635E-04	.120E-04

ROOF D TRANSFER FUNCTIONS (DNR)

1.00	-1.97	1.36	-.410	.534E-01	-.250E-02

SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.900000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	8.	2216.	8620.	9820.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.012	.000	.000	70.0	76.0
2	.100	.012	.000	.000	70.0	76.0
3	.100	.012	.000	.000	70.0	76.0
4	.100	.012	.000	.000	70.0	76.0
5	.100	.012	.000	.000	70.0	76.0
6	.100	.012	.000	.000	70.0	76.0
7	.100	.012	.000	.000	70.0	76.0
8	.100	.012	.000	.000	70.0	76.0

```
 9          .100       .012       .000       .000         70.0         76.0
10          .100       .012       .000       .000         70.0         76.0
11          .100       .012       .000       .000         70.0         76.0
12          .100       .012       .000       .000         70.0         76.0
13          .100       .012       .000       .000         70.0         76.0
14          .100       .012       .000       .000         70.0         76.0
15          .100       .012       .000       .000         70.0         76.0
16          .100       .012       .000       .000         70.0         76.0
17         1.000       .600       .600       .600         70.0         76.0
18         1.000       .900      1.000      1.000         70.0         76.0
19         1.000       .900      1.000      1.000         70.0         76.0
20         1.000       .600       .500       .500         70.0         76.0
21          .100       .012       .000       .000         70.0         76.0
22          .100       .012       .000       .000         70.0         76.0
23          .100       .012       .000       .000         70.0         76.0
24          .100       .012       .000       .000         70.0         76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       60.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)     6000.000000
ECONOMIZER HIGH TEMP LIMIT F        65.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       58.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     6.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  330000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   412500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100       .191       .200       .286       .300       .369       .400       .451
 .500       .537       .600       .625       .700       .718       .800       .812
 .900       .906      1.00       1.00
CHILLER TYPE (ITYPCH)            3
COOLING PLANT RATED OUTPUT BTU (CFLOT)   245500.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    64704.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000       .000       .000       .000       .000       .000       .000       .000
 .000       .000       .000       .000       .000       .000       .000       .000
 .000       .000       .000       .000
```

BLDG 639 - BRANCH PX STORE (ZONE 1) ECO-1 INSTALL FIBERGLASS INSUL.

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	1.35	.00	.00	.00	.00	.00	.00	.00
	-50.49	LOSS		-.73	-5.94	.00	-3.56	-1.48	-49.10	.00
FEB	.00	GAIN	1.84	.00	.00	.00	.00	.00	.00	.00
	-41.08	LOSS		-.60	-5.03	.00	-2.69	-1.26	-41.50	.00
MAR	.45	GAIN	2.30	.00	.00	.00	.03	.00	.01	.11
	-34.72	LOSS		-.53	-4.63	.00	-1.99	-1.16	-37.48	.00
APR	3.21	GAIN	2.42	.00	.03	.00	.28	.01	.22	.86
	-15.76	LOSS		-.29	-2.65	.00	-.81	-.66	-20.73	.00
MAY	9.67	GAIN	2.71	.03	.10	.00	.80	.03	.67	3.79
	-4.51	LOSS		-.12	-1.40	.00	-.12	-.34	-9.92	.00
JUN	26.15	GAIN	2.74	.06	.28	.00	1.40	.07	1.90	15.57
	-.47	LOSS		-.04	-.63	.00	.00	-.15	-4.28	.00
JUL	37.91	GAIN	2.83	.12	.70	.00	1.87	.17	4.78	21.53
	-.14	LOSS		-.02	-.40	.00	.00	-.10	-2.76	.00
AUG	34.98	GAIN	2.44	.09	.53	.00	1.52	.13	3.50	21.09
	-.34	LOSS		-.03	-.46	.00	.00	-.11	-3.04	.00
SEP	18.95	GAIN	2.10	.03	.27	.00	.74	.07	1.91	11.16
	-4.20	LOSS		-.12	-1.17	.00	-.19	-.29	-8.65	.00
OCT	3.28	GAIN	1.66	.00	.04	.00	.12	.01	.30	1.43
	-13.81	LOSS		-.31	-2.51	.00	-.98	-.61	-18.64	.00
NOV	.38	GAIN	1.24	.00	.00	.00	.01	.00	.01	.16
	-26.50	LOSS		-.47	-3.76	.00	-2.02	-.92	-29.06	.00
DEC	.00	GAIN	1.10	.00	.00	.00	.00	.00	.00	.00
	-49.02	LOSS		-.73	-5.85	.00	-3.65	-1.44	-47.59	.00
TOT	135.	GAIN	25.	0.	2.	0.	7.	0.	13.	76.
	-241.	LOSS		-4.	-34.	0.	-16.	-9.	-273.	0.

MAX HEATING LOAD= -169839. BTUH ON DEC 18 HOUR 7 AMBIENT TEMP -1.
MAX COOLING LOAD= 161881. BTUH ON JUL 28 HOUR 18 AMBIENT TEMP 90.

ZONE UA BTU/HR-F 439.7

BEACON Energy Analysis By EMC Engineers, Inc. 639AFG.I

BLDG 639 - BRANCH PX STORE (ZONE 1) ECO-1 INSTALL FIBERGLASS INSUL.

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	76.		4	20	58.	1.72	.50	1.95	8.97
			69.	27	6	4.				
FEB	70.	76.		13	20	59.	1.57	.45	1.76	8.16
			69.	2	7	14.				
MAR	70.	77.		10	19	63.	1.74	.50	1.95	9.05
			69.	4	6	15.				
APR	72.	77.		29	18	75.	1.69	.49	1.89	8.78
			70.	9	5	30.				
MAY	73.	77.		27	18	80.	1.72	.50	1.95	8.97
			70.	11	4	38.				
JUN	75.	77.		30	18	85.	1.69	.49	1.89	8.78
			70.	18	4	57.				
JUL	76.	77.		15	18	92.	1.74	.50	1.95	9.05
			70.	24	6	66.				
AUG	76.	77.		12	19	84.	1.72	.50	1.95	8.97
			70.	25	6	51.				
SEP	74.	77.		2	19	83.	1.71	.49	1.89	8.85
			70.	15	6	39.				
OCT	72.	77.		14	19	71.	1.72	.50	1.95	8.97
			70.	24	5	66.				
NOV	71.	77.		17	19	59.	1.67	.48	1.89	8.70
			69.	8	7	66.				
DEC	70.	77.		23	19	54.	1.76	.51	1.95	9.12
			69.	18	7	-1.				
YEAR							20.42	5.92	22.97	106.36

INTERNAL

BLDG 639 - BRANCH PX STORE (ZONE 1) ECO-1 INSTALL FIBERGLASS INSUL.

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	733	0	0	0	-.1609E+06	.0000
FEB	635	3	0	0	-.1320E+06	.0000
MAR	640	28	0	0	-.1335E+06	.7118E+05
APR	448	123	0	0	-.8248E+05	.7503E+05
MAY	264	228	0	0	-.5824E+05	.9925E+05
JUN	49	379	0	0	-.1938E+05	.1512E+06
JUL	22	513	0	0	-.1665E+05	.1619E+06
AUG	31	483	0	0	-.2705E+05	.1525E+06
SEP	168	292	0	0	-.5470E+05	.1450E+06
OCT	431	98	0	0	-.7879E+05	.8407E+05
NOV	577	30	0	0	-.1116E+06	.4857E+05
DEC	718	5	0	0	-.1698E+06	.0000
YEAR	4716	2182	0	0	-.1698E+06	.1619E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	89.45	.00	1.72	.50	.57	8.97	12.4
FEB	74.46	.00	1.57	.45	.52	8.16	12.4
MAR	68.62	.05	1.74	.50	.57	9.05	20.0
APR	40.50	.38	1.69	.49	.55	8.78	20.3
MAY	21.26	1.10	1.72	.50	.57	8.97	22.3
JUN	3.85	2.78	1.69	.49	.55	8.78	25.8
JUL	1.73	3.95	1.74	.50	.57	9.05	26.5
AUG	2.44	3.68	1.72	.50	.57	8.97	25.9
SEP	13.68	2.01	1.71	.49	.55	8.85	25.4
OCT	37.43	.38	1.72	.50	.57	8.97	20.0
NOV	57.86	.05	1.67	.48	.55	8.70	14.8
DEC	86.46	.00	1.76	.51	.57	9.12	12.4
YEAR	497.75	14.37	20.42	5.92	6.73	106.36	26.5

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 174148. BTU/(SQFT-YEAR)

BLDG 639 - BRANCH PX STORE (ZONE 1) ECO-1 INSTALL FIBERGLASS INSUL.

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.1609E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.1320E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.7118E+05	-.1335E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.7503E+05	-.8248E+05
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.9925E+05	-.5824E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.1512E+06	-.1938E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.1619E+06	-.1665E+05
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.1525E+06	-.2705E+05
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.1450E+06	-.5470E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.8407E+05	-.7879E+05
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.4857E+05	-.1116E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.1698E+06

BLDG 639 - BRANCH PX STORE (ZONE 1) ECO-2 INSTALL RIGID INSULATION
---------- PROGRAM CONTROL OPTIONS ----------
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.375000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0
--------- SITE AND BUILDING DATA --------------
******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 34650.820000
FLOOR AREA (SQFT) 3706.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 325000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -245500.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 37060.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 358.000000
INFILTRATION PROFILE

.930	.930	.930	.930	.930	.930	.930	.930
.930	.930	.930	.930	.930	.930	.930	.930
1.00	1.00	1.00	1.00	.930	.930	.930	.930

A FACTOR IN INFILTRATION EQUATION (CINA) 6.200000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 9170.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 158.900000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 67.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	207.0	542.0	851.0	941.0
WINDOW AREA SQFT (AWND)	.0	.0	.0	107.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	.0	.0	.0	10.7
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.055	.055	.055	.055
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00174	.00174	.00174	.00174
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00019	.00019	.00019	.00019
N=3	.00089	.00089	.00089	.00089
N=4	.00059	.00059	.00059	.00059
N=5	.00007	.00007	.00007	.00007
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	-.14508	-.14508	-.14508	-.14508
N=5	.00613	.00613	.00613	.00613
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 4011.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.500000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.861519E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .172E-05 .257E-04 .849E-04 .635E-04 .120E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.900000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	8.	2216.	8620.	9820.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.012	.000	.000	70.0	76.0
2	.100	.012	.000	.000	70.0	76.0
3	.100	.012	.000	.000	70.0	76.0
4	.100	.012	.000	.000	70.0	76.0
5	.100	.012	.000	.000	70.0	76.0
6	.100	.012	.000	.000	70.0	76.0
7	.100	.012	.000	.000	70.0	76.0
8	.100	.012	.000	.000	70.0	76.0

9	.100	.012	.000	.000	70.0	76.0
10	.100	.012	.000	.000	70.0	76.0
11	.100	.012	.000	.000	70.0	76.0
12	.100	.012	.000	.000	70.0	76.0
13	.100	.012	.000	.000	70.0	76.0
14	.100	.012	.000	.000	70.0	76.0
15	.100	.012	.000	.000	70.0	76.0
16	.100	.012	.000	.000	70.0	76.0
17	1.000	.600	.600	.600	70.0	76.0
18	1.000	.900	1.000	1.000	70.0	76.0
19	1.000	.900	1.000	1.000	70.0	76.0
20	1.000	.600	.500	.500	70.0	76.0
21	.100	.012	.000	.000	70.0	76.0
22	.100	.012	.000	.000	70.0	76.0
23	.100	.012	.000	.000	70.0	76.0
24	.100	.012	.000	.000	70.0	76.0

NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 60.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 6000.000000
ECONOMIZER HIGH TEMP LIMIT F 65.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.000000
SYSTEM MIXED AIR TEMP(TMXAIR) 58.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 6.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 330000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 412500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)

.100	.191	.200	.286	.300	.369	.400	.451
.500	.537	.600	.625	.700	.718	.800	.812
.900	.906	1.00	1.00				

CHILLER TYPE (ITYPCH) 3
COOLING PLANT RATED OUTPUT BTU (CFLOT) 245500.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 64704.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)

.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000				

BLDG 639 - BRANCH PX STORE (ZONE 1) ECO-2 INSTALL RIGID INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	1.35	.00	.00	.00	.00	.00	.00	.00
	-49.93	LOSS		-.73	-5.94	.00	-3.00	-1.48	-49.10	.00
FEB	.00	GAIN	1.84	.00	.00	.00	.00	.00	.00	.00
	-40.66	LOSS		-.60	-5.03	.00	-2.26	-1.26	-41.51	.00
MAR	.45	GAIN	2.30	.00	.00	.00	.03	.00	.01	.11
	-34.43	LOSS		-.53	-4.63	.00	-1.68	-1.16	-37.48	.00
APR	3.20	GAIN	2.42	.00	.03	.00	.25	.01	.22	.86
	-15.67	LOSS		-.29	-2.65	.00	-.69	-.66	-20.73	.00
MAY	9.61	GAIN	2.71	.03	.10	.00	.69	.03	.67	3.77
	-4.55	LOSS		-.12	-1.40	.00	-.11	-.34	-9.90	.00
JUN	25.74	GAIN	2.74	.06	.29	.00	1.18	.07	1.90	15.30
	-.49	LOSS		-.04	-.63	.00	.00	-.15	-4.24	.00
JUL	37.25	GAIN	2.83	.12	.70	.00	1.58	.17	4.78	21.12
	-.15	LOSS		-.02	-.40	.00	.00	-.10	-2.73	.00
AUG	34.65	GAIN	2.44	.09	.53	.00	1.28	.13	3.50	20.95
	-.35	LOSS		-.03	-.45	.00	.00	-.11	-3.01	.00
SEP	18.88	GAIN	2.10	.03	.27	.00	.63	.07	1.91	11.16
	-4.19	LOSS		-.12	-1.17	.00	-.17	-.29	-8.63	.00
OCT	3.29	GAIN	1.66	.00	.04	.00	.10	.01	.30	1.43
	-13.69	LOSS		-.31	-2.51	.00	-.83	-.61	-18.66	.00
NOV	.39	GAIN	1.24	.00	.00	.00	.01	.00	.01	.16
	-26.21	LOSS		-.47	-3.76	.00	-1.71	-.92	-29.08	.00
DEC	.00	GAIN	1.10	.00	.00	.00	.00	.00	.00	.00
	-48.46	LOSS		-.73	-5.85	.00	-3.07	-1.44	-47.60	.00
TOT	133.	GAIN	25.	0.	2.	0.	6.	0.	13.	75.
	-239.	LOSS		-4.	-34.	0.	-14.	-9.	-273.	0.

MAX HEATING LOAD= -168620. BTUH ON DEC 18 HOUR 7 AMBIENT TEMP -1.
MAX COOLING LOAD= 161325. BTUH ON JUL 28 HOUR 18 AMBIENT TEMP 90.

ZONE UA BTU/HR-F 413.5

BLDG 639 - BRANCH PX STORE (ZONE 1) ECO-2 INSTALL RIGID INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	76.		4	20	58.	1.72	.50	1.95	8.97
			69.	27	6	4.				
FEB	70.	76.		9	20	63.	1.57	.45	1.76	8.16
			69.	2	7	14.				
MAR	70.	77.		10	19	63.	1.74	.50	1.95	9.05
			70.	4	6	15.				
APR	72.	77.		29	18	75.	1.69	.49	1.89	8.78
			70.	9	5	30.				
MAY	73.	77.		27	18	80.	1.72	.50	1.95	8.97
			70.	11	4	38.				
JUN	75.	77.		30	18	85.	1.69	.49	1.89	8.78
			70.	18	4	57.				
JUL	76.	77.		15	18	92.	1.74	.50	1.95	9.05
			70.	24	6	66.				
AUG	76.	77.		12	19	84.	1.72	.50	1.95	8.97
			70.	25	6	51.				
SEP	74.	77.		2	19	83.	1.71	.49	1.89	8.85
			70.	15	6	39.				
OCT	72.	77.		14	19	71.	1.72	.50	1.95	8.97
			70.	24	5	66.				
NOV	71.	77.		17	19	59.	1.67	.48	1.89	8.70
			69.	8	7	66.				
DEC	70.	77.		23	19	54.	1.76	.51	1.95	9.12
			69.	18	7	-1.				
YEAR							20.42	5.92	22.97	106.36

BLDG 639 - BRANCH PX STORE (ZONE 1) ECO-2 INSTALL RIGID INSULATION

	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED		NUMBER OF HOURS WHEN LOADS WERE NOT MET		MAXIMUM LOADS BTU	
MONTH	HEATING	COOLING INCLUDING ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	733	0	0	0	-.1601E+06	.0000
FEB	634	4	0	0	-.1311E+06	.0000
MAR	639	28	0	0	-.1327E+06	.7149E+05
APR	448	123	0	0	-.8207E+05	.7482E+05
MAY	266	227	0	0	-.5818E+05	.9899E+05
JUN	51	372	0	0	-.1963E+05	.1508E+06
JUL	22	503	0	0	-.1692E+05	.1613E+06
AUG	32	480	0	0	-.2723E+05	.1520E+06
SEP	169	292	0	0	-.5451E+05	.1445E+06
OCT	430	98	0	0	-.7839E+05	.8385E+05
NOV	575	31	0	0	-.1108E+06	.4857E+05
DEC	718	5	0	0	-.1686E+06	.0000
YEAR	4717	2163	0	0	-.1686E+06	.1613E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	88.90	.00	1.72	.50	.57	8.97	12.4
FEB	74.00	.00	1.57	.45	.52	8.16	12.4
MAR	68.28	.05	1.74	.50	.57	9.05	20.0
APR	40.42	.38	1.69	.49	.55	8.78	20.3
MAY	21.42	1.09	1.72	.50	.57	8.97	22.2
JUN	4.01	2.73	1.69	.49	.55	8.78	25.8
JUL	1.73	3.88	1.74	.50	.57	9.05	26.5
AUG	2.51	3.65	1.72	.50	.57	8.97	25.9
SEP	13.76	2.00	1.71	.49	.55	8.85	25.4
OCT	37.29	.38	1.72	.50	.57	8.97	20.0
NOV	57.47	.05	1.67	.48	.55	8.70	14.8
DEC	85.91	.00	1.76	.51	.57	9.12	12.4
YEAR	495.69	14.22	20.42	5.92	6.73	106.36	26.5

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 173447. BTU/(SQFT-YEAR)

BLDG 639 - BRANCH PX STORE (ZONE 1) ECO-2 INSTALL RIGID INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.1601E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.1311E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.7149E+05	-.1327E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.7482E+05	-.8207E+05
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.9899E+05	-.5818E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.1508E+06	-.1963E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.1613E+06	-.1692E+05
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.1520E+06	-.2723E+05
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.1445E+06	-.5451E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.8385E+05	-.7839E+05
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.4857E+05	-.1108E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.1686E+06

BLDG 639 - Post Exchange Game room - Zone 2 BASELINE

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.375000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 9415.590000
FLOOR AREA (SQFT) 1046.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 44000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -42000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 10460.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 93.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	.850
.850	.850	.850	.850	.850	.850	.850	.850
1.00	1.00	1.00	1.00	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 5.930000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 5230.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 75.900000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 19.100000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	581.0	248.0	.0	239.0
WINDOW AREA SQFT (AWND)	.0	.0	.0	27.0
WINDOW HEIGHT FT (WNDH)	.0	.0	.0	2.7
WINDOW WIDTH FT (WNDW)	.0	.0	.0	10.0
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.113	.113	.113	.113
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00416	.00416	.00416	.00416
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00001	.00001	.00001	.00001
N=2	.00058	.00058	.00058	.00058
N=3	.00229	.00229	.00229	.00229
N=4	.00119	.00119	.00119	.00119
N=5	.00009	.00009	.00009	.00009
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71940	-1.71940	-1.71940	-1.71940
N=3	.84375	.84375	.84375	.84375
N=4	-.09022	-.09022	-.09022	-.09022
N=5	.00268	.00268	.00268	.00268
N=6	********	********	********	********

ROOF AREA SQFT (AROF) 1046.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.500000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.861519E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .172E-05 .257E-04 .849E-04 .635E-04 .120E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 1.500000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	2.	1382.	2700.	2200.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	1.000	.000	.000	70.0	76.0
2	.100	1.000	.000	.000	70.0	76.0
3	.100	1.000	.000	.000	70.0	76.0
4	.100	1.000	.000	.000	70.0	76.0
5	.100	1.000	.000	.000	70.0	76.0
6	.100	1.000	.000	.000	70.0	76.0
7	.100	1.000	.000	.000	70.0	76.0
8	.100	1.000	.000	.000	70.0	76.0

```
  9         .100      1.000       .000       .000         70.0        76.0
 10         .100      1.000       .000       .000         70.0        76.0
 11         .100      1.000       .000       .000         70.0        76.0
 12         .100      1.000       .000       .000         70.0        76.0
 13         .100      1.000       .000       .000         70.0        76.0
 14         .100      1.000       .000       .000         70.0        76.0
 15         .100      1.000       .000       .000         70.0        76.0
 16         .100      1.000       .000       .000         70.0        76.0
 17        1.000      1.000       .800       .800         70.0        76.0
 18        1.000      1.000      1.000      1.000         70.0        76.0
 19        1.000      1.000      1.000      1.000         70.0        76.0
 20        1.000      1.000       .800       .800         70.0        76.0
 21         .100      1.000       .000       .000         70.0        76.0
 22         .100      1.000       .000       .000         70.0        76.0
 23         .100      1.000       .000       .000         70.0        76.0
 24         .100      1.000       .000       .000         70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       60.000000
SYSTEM TYPE, (IECN)            2
SUPPLY AIR CFM (SACFM)     1000.000000
ECONOMIZER HIGH TEMP LIMIT F     0.000000E+00
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       65.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     0.000000E+00
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     6.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)    44000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)     55000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)             3
COOLING PLANT RATED OUTPUT BTU (CFLOT)     42000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)     10750.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 639 - Post Exchange Game room - Zone 2 BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	.34	.00	.00	.00	.00	.00	.00	.00
	-9.89	LOSS		-.19	-2.50	.00	-2.40	-.37	-8.12	.00
FEB	.00	GAIN	.46	.00	.00	.00	.01	.00	.00	.00
	-7.75	LOSS		-.16	-2.12	.00	-1.79	-.32	-6.89	.00
MAR	.22	GAIN	.57	.00	.00	.00	.10	.00	.00	.05
	-6.11	LOSS		-.14	-1.97	.00	-1.41	-.30	-6.19	.00
APR	1.14	GAIN	.60	.00	.02	.00	.33	.00	.04	.23
	-2.20	LOSS		-.08	-1.18	.00	-.66	-.18	-3.45	.00
MAY	3.11	GAIN	.67	.01	.04	.00	.61	.01	.10	.88
	-.28	LOSS		-.04	-.70	.00	-.22	-.10	-1.77	.00
JUN	7.49	GAIN	.68	.01	.11	.00	.97	.02	.28	3.42
	.00	LOSS		-.02	-.35	.00	-.04	-.05	-.84	.00
JUL	10.06	GAIN	.70	.03	.29	.00	1.37	.04	.74	4.28
	.00	LOSS		-.01	-.21	.00	-.02	-.03	-.51	.00
AUG	9.38	GAIN	.61	.02	.22	.00	1.19	.03	.52	4.29
	.00	LOSS		-.01	-.24	.00	-.02	-.03	-.56	.00
SEP	5.52	GAIN	.52	.01	.11	.00	.72	.02	.30	2.58
	-.30	LOSS		-.04	-.56	.00	-.20	-.08	-1.50	.00
OCT	1.20	GAIN	.42	.00	.02	.00	.22	.00	.05	.43
	-1.85	LOSS		-.09	-1.13	.00	-.72	-.16	-3.06	.00
NOV	.22	GAIN	.31	.00	.00	.00	.06	.00	.00	.07
	-4.53	LOSS		-.13	-1.62	.00	-1.33	-.24	-4.70	.00
DEC	.00	GAIN	.28	.00	.00	.00	.00	.00	.00	.00
	-9.54	LOSS		-.19	-2.46	.00	-2.42	-.36	-7.80	.00
TOT	38.33	GAIN	6.17	.08	.82	.00	5.58	.12	2.04	16.23
	-42.44	LOSS		-1.07	-15.04	.00	-11.23	-2.23	-45.40	.00

MAX HEATING LOAD= -36777. BTUH ON DEC 18 HOUR 7 AMBIENT TEMP -1.
MAX COOLING LOAD= 37174. BTUH ON JUL 28 HOUR 18 AMBIENT TEMP 90.

ZONE UA BTU/HR-F 193.1

BLDG 639 - Post Exchange Game room - Zone 2 BASELINE

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	76.		4	20	58.	.46	7.52	.33	3.35
			69.	29	7	14.				
FEB	70.	76.		9	20	63.	.42	6.86	.29	3.06
			69.	2	7	14.				
MAR	71.	79.		12	20	56.	.47	7.60	.33	3.39
			69.	3	7	15.				
APR	73.	79.		14	20	54.	.45	7.38	.31	3.29
			69.	9	6	30.				
MAY	75.	78.		22	20	54.	.46	7.52	.33	3.35
			70.	11	6	39.				
JUN	76.	77.		30	19	82.	.45	7.38	.31	3.29
			73.	18	6	59.				
JUL	76.	78.		15	19	87.	.47	7.60	.33	3.39
			74.	10	6	60.				
AUG	76.	77.		12	19	84.	.46	7.52	.33	3.35
			72.	25	7	55.				
SEP	75.	80.		16	20	55.	.46	7.46	.31	3.32
			70.	15	6	39.				
OCT	73.	80.		21	20	57.	.46	7.52	.33	3.35
			70.	11	6	36.				
NOV	71.	80.		17	20	56.	.45	7.30	.31	3.25
			69.	3	7	18.				
DEC	70.	79.		23	20	55.	.47	7.69	.33	3.42
			69.	18	7	-1.				
YEAR							5.47	89.35	3.83	39.82

BLDG 639 - Post Exchange Game room - Zone 2 BASELINE

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	690	0	0	0	-.3358E+05	.0000
FEB	592	0	0	0	-.2846E+05	.0000
MAR	536	25	0	0	-.2837E+05	.1816E+05
APR	288	133	0	0	-.1704E+05	.2112E+05
MAY	71	319	0	0	-.1056E+05	.2555E+05
JUN	0	596	0	0	.0000	.3455E+05
JUL	0	680	0	0	.0000	.3717E+05
AUG	0	677	0	0	.0000	.3510E+05
SEP	70	419	0	0	-9221.	.3548E+05
OCT	294	137	0	0	-.1441E+05	.2132E+05
NOV	454	29	0	0	-.2252E+05	.1413E+05
DEC	679	0	0	0	-.3678E+05	.0000
YEAR	3674	3015	0	0	-.3678E+05	.3717E+05

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	14.91	.00	.46	7.52	.10	3.35	3.2
FEB	12.01	.00	.42	6.86	.09	3.06	3.2
MAR	9.94	.02	.47	7.60	.10	3.39	5.0
APR	4.26	.12	.45	7.38	.09	3.29	5.2
MAY	.84	.32	.46	7.52	.10	3.35	5.5
JUN	.00	.75	.45	7.38	.09	3.29	6.0
JUL	.00	.97	.47	7.60	.10	3.39	6.1
AUG	.00	.92	.46	7.52	.10	3.35	6.0
SEP	.82	.55	.46	7.46	.09	3.32	6.0
OCT	3.94	.13	.46	7.52	.10	3.35	5.1
NOV	7.78	.02	.45	7.30	.09	3.25	4.4
DEC	14.45	.00	.47	7.69	.10	3.42	3.2
YEAR	68.94	3.81	5.47	89.35	1.12	39.82	6.1

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 185266. BTU/(SQFT-YEAR)

BLDG 639 - Post Exchange Game room - Zone 2 BASELINE

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.3358E+05
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2846E+05
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1816E+05	-.2837E+05
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.2112E+05	-.1704E+05
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.2555E+05	-.1056E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.3455E+05	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.3717E+05	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.3510E+05	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.3548E+05	-9221.
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.2132E+05	-.1441E+05
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1413E+05	-.2252E+05
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.3678E+05

BLDG 639 - BRANCH PX GAME ROOM (ZONE 2) ECO-2 INSTALL FIBERGLASS INSUL.

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.375000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 9415.590000
FLOOR AREA (SQFT) 1046.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 44000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -42000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 10460.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 93.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	.850
.850	.850	.850	.850	.850	.850	.850	.850
1.00	1.00	1.00	1.00	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 5.930000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 5230.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 75.900000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 19.100000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	581.0	248.0	.0	239.0
WINDOW AREA SQFT (AWND)	.0	.0	.0	27.0
WINDOW HEIGHT FT (WNDH)	.0	.0	.0	2.7
WINDOW WIDTH FT (WNDW)	.0	.0	.0	10.0
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.064	.064	.064	.064
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00176	.00176	.00176	.00176
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00016	.00016	.00016	.00016
N=3	.00086	.00086	.00086	.00086
N=4	.00066	.00066	.00066	.00066
N=5	.00008	.00008	.00008	.00008
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	-.16643	-.16643	-.16643	-.16643
N=5	.00728	.00728	.00728	.00728
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 1046.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.500000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.861519E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .172E-05 .257E-04 .849E-04 .635E-04 .120E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 1.500000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	2.	1382.	2700.	2200.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	1.000	.000	.000	70.0	76.0
2	.100	1.000	.000	.000	70.0	76.0
3	.100	1.000	.000	.000	70.0	76.0
4	.100	1.000	.000	.000	70.0	76.0
5	.100	1.000	.000	.000	70.0	76.0
6	.100	1.000	.000	.000	70.0	76.0
7	.100	1.000	.000	.000	70.0	76.0
8	.100	1.000	.000	.000	70.0	76.0

```
   9        .100     1.000      .000      .000        70.0       76.0
  10        .100     1.000      .000      .000        70.0       76.0
  11        .100     1.000      .000      .000        70.0       76.0
  12        .100     1.000      .000      .000        70.0       76.0
  13        .100     1.000      .000      .000        70.0       76.0
  14        .100     1.000      .000      .000        70.0       76.0
  15        .100     1.000      .000      .000        70.0       76.0
  16        .100     1.000      .000      .000        70.0       76.0
  17       1.000     1.000      .800      .800        70.0       76.0
  18       1.000     1.000     1.000     1.000        70.0       76.0
  19       1.000     1.000     1.000     1.000        70.0       76.0
  20       1.000     1.000      .800      .800        70.0       76.0
  21        .100     1.000      .000      .000        70.0       76.0
  22        .100     1.000      .000      .000        70.0       76.0
  23        .100     1.000      .000      .000        70.0       76.0
  24        .100     1.000      .000      .000        70.0       76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)      65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)      60.000000
SYSTEM TYPE, (IECN)          2
SUPPLY AIR CFM (SACFM)    1000.000000
ECONOMIZER HIGH TEMP LIMIT F    0.000000E+00
SYSTEM SUPPLY AIR START TIME HR    0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR       24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)      65.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)    0.000000E+00
FAN EFFICIENCY (EFAN)    5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)    6.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)   44000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)    55000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906      1.00      1.00
CHILLER TYPE (ITYPCH)           3
COOLING PLANT RATED OUTPUT BTU (CFLOT)    42000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    10750.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 639 - BRANCH PX GAME ROOM (ZONE 2) ECO-2 INSTALL FIBERGLASS INSUL.

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	.34	.00	.00	.00	.00	.00	.00	.00
	-8.85	LOSS		-.19	-2.50	.00	-1.35	-.37	-8.13	.00
FEB	.00	GAIN	.46	.00	.00	.00	.00	.00	.00	.00
	-6.98	LOSS		-.16	-2.12	.00	-1.01	-.32	-6.89	.00
MAR	.21	GAIN	.57	.00	.00	.00	.02	.00	.00	.05
	-5.51	LOSS		-.14	-1.97	.00	-.75	-.30	-6.18	.00
APR	1.04	GAIN	.60	.00	.01	.00	.13	.00	.04	.23
	-1.96	LOSS		-.08	-1.17	.00	-.32	-.18	-3.44	.00
MAY	2.89	GAIN	.67	.01	.04	.00	.29	.01	.10	.85
	-.24	LOSS		-.04	-.70	.00	-.07	-.10	-1.76	.00
JUN	7.05	GAIN	.68	.01	.11	.00	.53	.02	.28	3.37
	.00	LOSS		-.02	-.35	.00	.00	-.05	-.83	.00
JUL	9.44	GAIN	.70	.03	.29	.00	.76	.04	.74	4.25
	.00	LOSS		-.01	-.21	.00	.00	-.03	-.51	.00
AUG	8.85	GAIN	.61	.02	.22	.00	.67	.03	.52	4.26
	.00	LOSS		-.01	-.23	.00	.00	-.03	-.56	.00
SEP	5.25	GAIN	.52	.01	.11	.00	.37	.02	.30	2.57
	-.26	LOSS		-.04	-.56	.00	-.07	-.08	-1.50	.00
OCT	1.15	GAIN	.42	.00	.02	.00	.08	.00	.05	.43
	-1.58	LOSS		-.09	-1.13	.00	-.36	-.17	-3.06	.00
NOV	.20	GAIN	.31	.00	.00	.00	.01	.00	.00	.07
	-3.98	LOSS		-.13	-1.62	.00	-.73	-.24	-4.72	.00
DEC	.00	GAIN	.28	.00	.00	.00	.00	.00	.00	.00
	-8.50	LOSS		-.19	-2.47	.00	-1.37	-.36	-7.81	.00
TOT	36.09	GAIN	6.17	.08	.81	.00	2.85	.12	2.03	16.09
	-37.86	LOSS		-1.07	-15.04	.00	-6.04	-2.23	-45.38	.00

MAX HEATING LOAD= -33240. BTUH ON DEC 18 HOUR 7 AMBIENT TEMP -1.
MAX COOLING LOAD= 35227. BTUH ON JUL 28 HOUR 18 AMBIENT TEMP 90.

ZONE UA BTU/HR-F 140.8

BLDG 639 - BRANCH PX GAME ROOM (ZONE 2) ECO-2 INSTALL FIBERGLASS INSUL.

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	76.		4	20	58.	.46	7.52	.33	3.35
			69.	29	4	11.				
FEB	70.	76.		9	20	63.	.42	6.86	.29	3.06
			69.	6	7	14.				
MAR	71.	78.		12	20	56.	.47	7.60	.33	3.39
			69.	4	6	15.				
APR	73.	79.		14	20	54.	.45	7.38	.31	3.29
			70.	9	6	30.				
MAY	75.	78.		22	20	54.	.46	7.52	.33	3.35
			70.	11	5	39.				
JUN	76.	77.		30	19	82.	.45	7.38	.31	3.29
			73.	19	6	59.				
JUL	76.	77.		15	19	87.	.47	7.60	.33	3.39
			73.	10	6	60.				
AUG	76.	77.		11	19	84.	.46	7.52	.33	3.35
			72.	25	7	55.				
SEP	75.	80.		16	20	55.	.46	7.46	.31	3.32
			70.	15	6	39.				
OCT	73.	80.		21	20	57.	.46	7.52	.33	3.35
			70.	19	7	33.				
NOV	71.	80.		17	20	56.	.45	7.30	.31	3.25
			69.	3	7	18.				
DEC	70.	79.		23	20	55.	.47	7.69	.33	3.42
			69.	18	7	-1.				
YEAR							5.47	89.35	3.83	39.82

BLDG 639 - BRANCH PX GAME ROOM (ZONE 2) ECO-2 INSTALL FIBERGLASS INSUL.

	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED		NUMBER OF HOURS WHEN LOADS WERE NOT MET		MAXIMUM LOADS BTU	
MONTH	HEATING	COOLING INCLUDING ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	680	0	0	0	-.3099E+05	.0000
FEB	587	0	0	0	-.2581E+05	.0000
MAR	530	26	0	0	-.2587E+05	.1730E+05
APR	282	126	0	0	-.1505E+05	.1992E+05
MAY	62	300	0	0	-9618.	.2408E+05
JUN	0	579	0	0	.0000	.3321E+05
JUL	0	670	0	0	.0000	.3523E+05
AUG	0	668	0	0	.0000	.3344E+05
SEP	66	416	0	0	-8306.	.3357E+05
OCT	277	133	0	0	-.1328E+05	.1980E+05
NOV	440	29	0	0	-.2032E+05	.1341E+05
DEC	670	0	0	0	-.3324E+05	.0000
YEAR	3594	2947	0	0	-.3324E+05	.3523E+05

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	13.75	.00	.46	7.52	.10	3.35	3.2
FEB	11.19	.00	.42	6.86	.09	3.06	3.2
MAR	9.27	.02	.47	7.60	.10	3.39	4.9
APR	3.97	.11	.45	7.38	.09	3.29	5.1
MAY	.73	.30	.46	7.52	.10	3.35	5.4
JUN	.00	.71	.45	7.38	.09	3.29	5.9
JUL	.00	.93	.47	7.60	.10	3.39	6.0
AUG	.00	.88	.46	7.52	.10	3.35	5.9
SEP	.75	.53	.46	7.46	.09	3.32	5.9
OCT	3.56	.12	.46	7.52	.10	3.35	5.1
NOV	7.12	.02	.45	7.30	.09	3.25	4.4
DEC	13.29	.00	.47	7.69	.10	3.42	3.2
YEAR	63.63	3.62	5.47	89.35	1.12	39.82	6.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 179580. BTU/(SQFT-YEAR)

BLDG 639 - BRANCH PX GAME ROOM (ZONE 2) ECO-2 INSTALL FIBERGLASS INSUL.

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.3099E+05
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2581E+05
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1730E+05	-.2587E+05
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1992E+05	-.1505E+05
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.2408E+05	-9618.
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.3321E+05	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.3523E+05	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.3344E+05	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.3357E+05	-8306.
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1980E+05	-.1328E+05
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1341E+05	-.2032E+05
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.3324E+05

BLDG 639 - BRANCH PX GAME ROOM (ZONE 2) ECO-2 INSTALL RIGID INSULATION

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.375000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******

FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 9415.590000
FLOOR AREA (SQFT) 1046.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 44000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -42000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 10460.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 93.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	.850
.850	.850	.850	.850	.850	.850	.850	.850
1.00	1.00	1.00	1.00	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 5.930000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 5230.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 75.900000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 19.100000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	581.0	248.0	.0	239.0
WINDOW AREA SQFT (AWND)	.0	.0	.0	27.0
WINDOW HEIGHT FT (WNDH)	.0	.0	.0	2.7
WINDOW WIDTH FT (WNDW)	.0	.0	.0	10.0
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.055	.055	.055	.055
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00174	.00174	.00174	.00174
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00019	.00019	.00019	.00019
N=3	.00089	.00089	.00089	.00089
N=4	.00059	.00059	.00059	.00059
N=5	.00007	.00007	.00007	.00007
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	-.14508	-.14508	-.14508	-.14508
N=5	.00613	.00613	.00613	.00613
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 1046.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.500000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.861519E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .172E-05 .257E-04 .849E-04 .635E-04 .120E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 1.500000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	2.	1382.	2700.	2200.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	1.000	.000	.000	70.0	76.0
2	.100	1.000	.000	.000	70.0	76.0
3	.100	1.000	.000	.000	70.0	76.0
4	.100	1.000	.000	.000	70.0	76.0
5	.100	1.000	.000	.000	70.0	76.0
6	.100	1.000	.000	.000	70.0	76.0
7	.100	1.000	.000	.000	70.0	76.0
8	.100	1.000	.000	.000	70.0	76.0

```
  9         .100     1.000      .000      .000        70.0        76.0
 10         .100     1.000      .000      .000        70.0        76.0
 11         .100     1.000      .000      .000        70.0        76.0
 12         .100     1.000      .000      .000        70.0        76.0
 13         .100     1.000      .000      .000        70.0        76.0
 14         .100     1.000      .000      .000        70.0        76.0
 15         .100     1.000      .000      .000        70.0        76.0
 16         .100     1.000      .000      .000        70.0        76.0
 17        1.000     1.000      .800      .800        70.0        76.0
 18        1.000     1.000     1.000     1.000        70.0        76.0
 19        1.000     1.000     1.000     1.000        70.0        76.0
 20        1.000     1.000      .800      .800        70.0        76.0
 21         .100     1.000      .000      .000        70.0        76.0
 22         .100     1.000      .000      .000        70.0        76.0
 23         .100     1.000      .000      .000        70.0        76.0
 24         .100     1.000      .000      .000        70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       60.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)    1000.000000
ECONOMIZER HIGH TEMP LIMIT F    0.000000E+00
SYSTEM SUPPLY AIR START TIME HR    0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR       24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)      65.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)    0.000000E+00
FAN EFFICIENCY (EFAN)    5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)    6.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)   44000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)    55000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)            3
COOLING PLANT RATED OUTPUT BTU (CFLOT)    42000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    10750.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 639 - BRANCH PX GAME ROOM (ZONE 2) ECO-2 INSTALL RIGID INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	.34	.00	.00	.00	.00	.00	.00	.00
	-8.66	LOSS		-.19	-2.50	.00	-1.16	-.37	-8.13	.00
FEB	.00	GAIN	.46	.00	.00	.00	.00	.00	.00	.00
	-6.84	LOSS		-.16	-2.12	.00	-.87	-.32	-6.89	.00
MAR	.21	GAIN	.57	.00	.00	.00	.02	.00	.00	.05
	-5.42	LOSS		-.14	-1.97	.00	-.65	-.30	-6.19	.00
APR	1.04	GAIN	.60	.00	.01	.00	.12	.00	.04	.23
	-1.93	LOSS		-.08	-1.17	.00	-.28	-.18	-3.44	.00
MAY	2.86	GAIN	.67	.01	.04	.00	.26	.01	.10	.85
	-.24	LOSS		-.04	-.70	.00	-.06	-.10	-1.76	.00
JUN	6.94	GAIN	.68	.01	.11	.00	.45	.02	.28	3.34
	.00	LOSS		-.02	-.35	.00	.00	-.05	-.83	.00
JUL	9.32	GAIN	.70	.03	.29	.00	.66	.04	.74	4.23
	.00	LOSS		-.01	-.21	.00	.00	-.03	-.51	.00
AUG	8.73	GAIN	.61	.02	.22	.00	.57	.03	.53	4.23
	.00	LOSS		-.01	-.23	.00	.00	-.03	-.55	.00
SEP	5.20	GAIN	.52	.01	.11	.00	.32	.02	.30	2.56
	-.26	LOSS		-.04	-.56	.00	-.07	-.08	-1.50	.00
OCT	1.14	GAIN	.42	.00	.02	.00	.07	.00	.05	.43
	-1.54	LOSS		-.09	-1.13	.00	-.31	-.17	-3.07	.00
NOV	.21	GAIN	.31	.00	.00	.00	.01	.00	.00	.07
	-3.90	LOSS		-.13	-1.63	.00	-.63	-.24	-4.72	.00
DEC	.00	GAIN	.28	.00	.00	.00	.00	.00	.00	.00
	-8.31	LOSS		-.19	-2.47	.00	-1.17	-.36	-7.82	.00
TOT	35.65	GAIN	6.17	.08	.81	.00	2.48	.12	2.03	15.99
	-37.10	LOSS		-1.07	-15.04	.00	-5.22	-2.23	-45.40	.00

MAX HEATING LOAD= -32831. BTUH ON DEC 18 HOUR 7 AMBIENT TEMP -1.
MAX COOLING LOAD= 35029. BTUH ON JUL 28 HOUR 18 AMBIENT TEMP 90.

ZONE UA BTU/HR-F 131.2

BLDG 639 - BRANCH PX GAME ROOM (ZONE 2) ECO-2 INSTALL RIGID INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL INTERNAL HEAT GAIN MILLION BTU
JAN	70.	76.		4	20	58.	.46	7.52	.33	3.35
			69.	29	4	11.				
FEB	70.	76.		13	20	59.	.42 .	6.86	.29	3.06
			69.	6	7	14.				
MAR	71.	78.		12	20	56.	.47	7.60	.33	3.39
			69.	3	6	15.				
APR	73.	79.		14	20	54.	.45	7.38	.31	3.29
			70.	9	6	30.				
MAY	75.	78.		22	20	54.	.46	7.52	.33	3.35
			70.	11	5	39.				
JUN	76.	77.		30	19	82.	.45	7.38	.31	3.29
			72.	19	6	59.				
JUL	76.	77.		15	19	87.	.47	7.60	.33	3.39
			73.	10	6	60.				
AUG	76.	77.		11	19	84.	.46	7.52	.33	3.35
			72.	25	7	55.				
SEP	75.	80.		16	20	55.	.46	7.46	.31	3.32
			70.	15	6	39.				
OCT	73.	80.		21	20	57.	.46	7.52	.33	3.35
			70.	19	7	33.				
NOV	71.	80.		17	20	56.	.45	7.30	.31	3.25
			69.	3	7	18.				
DEC	70.	79.		23	20	55.	.47	7.69	.33	3.42
			69.	18	7	-1.				
YEAR							5.47	89.35	3.83	39.82

BLDG 639 - BRANCH PX GAME ROOM (ZONE 2) ECO-2 INSTALL RIGID INSULATION

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	678	0	0	0	-.3071E+05	.0000
FEB	586	0	0	0	-.2553E+05	.0000
MAR	529	26	0	0	-.2561E+05	.1755E+05
APR	281	127	0	0	-.1492E+05	.1985E+05
MAY	62	295	0	0	-9600.	.2401E+05
JUN	0	568	0	0	.0000	.3306E+05
JUL	0	663	0	0	.0000	.3503E+05
AUG	0	662	0	0	.0000	.3327E+05
SEP	65	414	0	0	-8259.	.3340E+05
OCT	273	133	0	0	-.1316E+05	.1971E+05
NOV	436	29	0	0	-.2007E+05	.1340E+05
DEC	667	0	0	0	-.3283E+05	.0000
YEAR	3577	2917	0	0	-.3283E+05	.3503E+05

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	13.55	.00	.46	7.52	.10	3.35	3.2
FEB	11.05	.00	.42	6.86	.09	3.06	3.2
MAR	9.17	.02	.47	7.60	.10	3.39	4.9
APR	3.93	.11	.45	7.38	.09	3.29	5.1
MAY	.73	.30	.46	7.52	.10	3.35	5.4
JUN	.00	.70	.45	7.38	.09	3.29	5.9
JUL	.00	.91	.47	7.60	.10	3.39	6.0
AUG	.00	.87	.46	7.52	.10	3.35	5.9
SEP	.74	.52	.46	7.46	.09	3.32	5.9
OCT	3.50	.12	.46	7.52	.10	3.35	5.1
NOV	7.01	.02	.45	7.30	.09	3.25	4.4
DEC	13.07	.00	.47	7.69	.10	3.42	3.2
YEAR	62.75	3.58	5.47	89.35	1.12	39.82	6.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 178601. BTU/(SQFT-YEAR)

BLDG 639 - BRANCH PX GAME ROOM (ZONE 2) ECO-2 INSTALL RIGID INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	-	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.3071E+05
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2553E+05
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1755E+05	-.2561E+05
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1985E+05	-.1492E+05
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.2401E+05	-9600.
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.3306E+05	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.3503E+05	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.3327E+05	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.3340E+05	-8259.
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1971E+05	-.1316E+05
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1340E+05	-.2007E+05
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.3283E+05

BUILDING MANAGER INTERVIEW

BUILDING INFORMATION:						
Building No:	639	Building Name:	Post Exchange			
Surveyed by:	DMS	Date:	11/7/95	Building Use:	Food & Clothing Outlet	
Building Contact:				Phone No:		
Building Contact:				Phone No:		
OCCUPANCY:						
Number of Employees:	Mon.:		Schedule:		To	
	Tues.-Sat.:	3		1700	To	2000
	Sun.	3		1300	To	1930
Visitors Per Day:	Mon.:		Schedule:		To	
	Tues.-Sat.:	50		1700	To	2000
	Sun.	50		1300	To	1930
Comments:						
LIGHTING SCHEDULE:						
Normal Occupancy:	Mon.:		Schedule:		To	
	Tues.-Sat.:			1700	To	2000
	Sun.:			1300	To	1930
EQUIPMENT SCHEDULE:						
Fan/AHU Schedule:	Mon.-Fri.:		Schedule:	0	To	2400
	Sat./Sun.:			0	To	2400
Chiller Schedule:	Mon.-Fri.:		Schedule:	0	To	2400
	Sat./Sun.:			0	To	2400
Boiler Schedule:	Mon.-Fri.:		Schedule:		To	
	Sat./Sun.:				To	
Aux. Equipment Schedule:						
Domestic HW	Mon.-Fri.:		Schedule:	0	To	2400
	Sat./Sun.:			0	To	2400
	Mon.-Fri.:		Schedule:		To	
	Sat./Sun.:				To	
Comments:						

Building No 639 **Building Name:** Post Exchange

BUILDING ENVELOPE

EXTERIOR WALLS

Wall Direction (N, E, W, or S)	Wall Construction No.	Comments
N	XW-1	
E	XW-2	
S	XW-2	
W	XW-1	

LIST OF EXT. WALL CONSTRUCTION TYPES

Wall Construction No.	Description
XW-1	Face Brick & CMU
XW-2	Face Brick, CMU, & Gyp. Board
XW-3	Face Brick, CMU, & Ceramic Tile
XW-4	Face Brick, CMU, & Plaster Coat
XW-5	Insulated Metal Panel

WINDOWS

Window Direction (N, E, W, or S)	Window Construction No.	Comments
W	W-1	

LIST OF WINDOW TYPES

Window Construction No.	Description
W-1	Double Pane Clear
W-2	Double Pane Tinted
W-3	Single Pane with Storm Windows
W-4	Single Pane

ROOF CONSTRUCTION

Roof Location	Roof Construction No.	Comments
Game Room		
ALL	R-2	
Store Area		
ALL	R-2	

LIST OF ROOF CONSTRUCTION TYPES

Roof Construction No.	Description
R-1	BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile
R-2	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Ceiling Tile
R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Clg
R-4	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plaster Clg.
R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceiling Tile
R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaster Clg.
R-7	Metal Deck, 1" Rigid Insulation, 6" Batt, Ceiling Tile

Building No 639 **Building Name:** Post Exchange

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

INTERIOR EQUIPMENT AND OBJECTS			
Wall Direction (N, E, W, or S)	Item No.	No. of Items	Comments
Store Area			
S	A-6	1	Clothing shelves on North side 25' long, by
S	F-2	1	8' high
E	A-5	1	
E	E-2	1	
E	E-5	1	
E	M-1	1	
W	A-6	2	Storage shelves in supply room 30' long by
W	L-3	1	8' high
W	E-3	1	
Gameroom			
E	E-3	1	
E	F-1	1	
N	E-2	4	1/2" piping for unit heaters
N	M-5	2	
W	E-2	5	
			E, S, W, walls covered with wood paneling
			3'-0" A.F.F.

LIST OF EQUIPMENT AND OBJECTS	
Item No.	Description
	Architectural
A-1	Interior Partitions
A-2	Wall Placards
A-3	Drapery Valances
A-4	Drapery Rods
A-5	Hair Dryer
A-6	Shelves
	Plumbing
P-1	Sinks
P-2	Commodes
P-3	Toilet Stalls
P-4	Water Fountains
	HVAC Mechanical
M-1	Floor Supply/Return Grilles
M-2	Ceiling Supply/Return Grilles
M-3	Finned-Tube Baseboard Radiators
M-4	Thermostats / Space Temp. Sensors
M-5	Fan Coil Unit
	Electrical
E-1	Electrical Panels
E-2	Electrical Outlets
E-3	Electrical Light Switches
E-4	Wall Mounted Television
E-5	Electric Hand Dryer
	Lighting
L-1	Wall Mounted Fixtures
L-2	Ceiling Mounted Fixtures
L-3	Exit Signs
	Fire Protection
F-1	Alarm Pull Switches
F-2	Alarm Sound Devices (Speakers, Bells)
F-3	Sprinkler Heads
F-4	Fire Extinguishes
	Communication
C-1	Telephones - Wall Mounted
C-2	Telephones - Booth Mounted
C-3	Telephone Jacks

Building No 744 **Building Name:** Post Exchange

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

INTERIOR EQUIPMENT AND OBJECTS				LIST OF EQUIPMENT AND OBJECTS	
Wall Direction (N, E, W, or S)	Item No.	No. of Items	Comments	Item No.	Description
					Architectural
			Same as Bldg 639 except for the following:	A-1	Interior Partitions
				A-2	Wall Placards
W			Phone Center alone west wall, includes	A-3	Drapery Valances
			8 phone booths	A-4	Drapery Rods
				A-5	Hair Dryer
				A-6	Shelves
					Plumbing
				P-1	Sinks
				P-2	Commodes
				P-3	Toilet Stalls
				P-4	Water Fountains
					HVAC Mechanical
				M-1	Floor Supply/Return Grilles
				M-2	Ceiling Supply/Return Grilles
				M-3	Finned-Tube Baseboard Radiators
				M-4	Thermostats / Space Temp. Sensors
				M-5	Fan Coil Unit
					Electrical
				E-1	Electrical Panels
				E-2	Electrical Outlets
				E-3	Electrical Light Switches
				E-4	Wall Mounted Television
				E-5	Electric Hand Dryer
					Lighting
				L-1	Wall Mounted Fixtures
				L-2	Ceiling Mounted Fixtures
				L-3	Exit Signs
					Fire Protection
				F-1	Alarm Pull Switches
				F-2	Alarm Sound Devices (Speakers, Bells)
				F-3	Sprinkler Heads
				F-4	Fire Extinguishers
					Communication
				C-1	Telephones - Wall Mounted
				C-2	Telephones - Booth Mounted
				C-3	Telephone Jacks

BUILDING MANAGER INTERVIEW

BUILDING INFORMATION:							
Building No:	1026	Building Name:	Post Exchange				
Surveyed by:	DMS	Date:	11/6/95	Building Use:	Food & Clothing Outlet		
Building Contact:				Phone No:			
Building Contact:				Phone No:			
OCCUPANCY:							
Number of Employees:	Mon.:	6		Schedule:	730	To	1300
	Tues.-Wed.:	6			730	To	1900
	Thurs.-Fri.	6			730	To	2000
	Sat./Sun.	6			1200	To	1900
Visitors Per Day:	Mon.:	65		Schedule:	730	To	1300
	Tues.-Wed.:	65			730	To	1900
	Thurs.-Fri.	65			730	To	2000
	Sat./Sun.	65			1200	To	1900
Comments:							
LIGHTING SCHEDULE:							
Normal Occupancy:	Mon.:			Schedule:	730	To	1300
	Tues.-Wed.:				730	To	1900
	Thurs.-Fri.				730	To	2000
	Sat./Sun.				1200	To	1900
EQUIPMENT SCHEDULE:							
Fan/AHU Schedule:	Mon.-Fri.:			Schedule:	0	To	2400
	Sat./Sun.:				0	To	2400
Chiller Schedule:	Mon.-Fri.:			Schedule:	0	To	2400
	Sat./Sun.:				0	To	2400
	Mon.-Fri.:			Schedule:		To	
	Sat./Sun.:					To	
Aux. Equipment Schedule:							
Domestic HW	Mon.-Fri.:			Schedule:	0	To	2400
	Sat./Sun.:				0	To	2400
	Mon.-Fri.:			Schedule:		To	
	Sat./Sun.:					To	
Comments:							

Building No 1026 **Building Name:** Post Exchange

BUILDING ENVELOPE

EXTERIOR WALLS

Wall Direction (N, E, W, or S)	Wall Construction No.	Comments
N	XW-5	
E	XW-5	
S	XW-5	
W	XW-5	

LIST OF EXT. WALL CONSTRUCTION TYPES

Wall Construction No.	Description
XW-1	Face Brick & CMU
XW-2	Face Brick, CMU, & Gyp. Board
XW-3	Face Brick, CMU, & Ceramic Tile
XW-4	Face Brick, CMU, & Plaster Coat
XW-5	Face Brick, 2.5" Rigid Insul., and CMU with Loose-Fill Insul. in Cores

WINDOWS

Window Direction (N, E, W, or S)	Window Construction No.	Comments
S	W-2	
W	W-2	

LIST OF WINDOW TYPES

Window Construction No.	Description
W-1	Double Pane Clear
W-2	Double Pane Tinted
W-3	Single Pane with Storm Windows
W-4	Single Pane

ROOF CONSTRUCTION

Roof Location	Roof Construction No.	Comments
All	R-5	

LIST OF ROOF CONSTRUCTION TYPES

Roof Construction No.	Description
R-1	BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile
R-2	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Ceiling Tile
R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Clg
R-4	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plaster Clg.
R-5	One-Ply Ballast Roofing, 4" Rigid Insul., Metal Roof Deck, Air Space, and Ceiling Tile
R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaster Clg.
R-7	Metal Deck, 1" Rigid Insulation, 6" Batt, Ceiling Tile

Building No 1026 Building Name: Post Exchange

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

INTERIOR EQUIPMENT AND OBJECTS			
Wall Direction (N, E, W, or S)	Item No.	No. of Items	Comments
N	P-1	1	
N	E-2	3	
N	L-3	1	
N	A-6	1	50' of clothing shelves
N	A-8	1	
E	E-2	2	
E	C-1	1	
E	A-5	1	Tile on toilet wall - from floor to ceiling
E	P-3	2	
S	E-2	3	
S	A-5	3	Wood paneling 3' high and 30' long
S	P-1	2	
S	A-9	1	10' long cabinets in Barber Shop
W	F-4	1	Tile on toilet wall - 6' up from floor
W	F-2	2	
W	L-3	1	
W	E-4	2	
W	E-2	1	
W	P-5	6	

LIST OF EQUIPMENT AND OBJECTS	
Item No.	Description
	Architectural
A-1	Interior Partitions
A-2	Wall Placards
A-3	Drapery Valances
A-4	Drapery Rods
A-5	Hair Dryer
A-6	Shelves
A-7	Mirror
A-8	Peg Board Wall
A-9	Cabinets
	Plumbing
P-1	Sinks
P-2	Commodes
P-3	Toilet Stalls
P-4	Water Fountains
	HVAC Mechanical
M-1	Floor Supply/Return Grilles
M-2	Ceiling Supply/Return Grilles
M-3	Finned-Tube Baseboard Radiators
M-4	Thermostats / Space Temp. Sensors
M-5	Fan Coil Unit
	Electrical
E-1	Electrical Panels
E-2	Electrical Outlets
E-3	Electrical Light Switches
E-4	Wall Mounted Television
E-5	Electric Hand Dryer
	Lighting
L-1	Wall Mounted Fixtures
L-2	Ceiling Mounted Fixtures
L-3	Exit Signs
	Fire Protection
F-1	Alarm Pull Switches
F-2	Alarm Sound Devices (Speakers, Bells)
F-3	Sprinkler Heads
F-4	Fire Extinguishes
	Communication
C-1	Telephones - Wall Mounted
C-2	Telephones - Booth Mounted
C-3	Telephone Jacks

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
BLDG: **639**
FILE: **639AH1**

AIR HANDLING UNIT SURVEY OBSERVATIONS

AHU-1	AHU NO.	**MECH. RM.**	LOCATION (RM)
ACCU-1	REF. SYS. SERVING AHU	**STORE/ SNACK BAR**	SERVES AREA

UNIT TYPE:

	SINGLE ZN		2-PIPE FC		4-PIPE FC		UNIT HTR		H&V
X	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION		VAV
3	NUMBER OF ZONES				OTHER				
	COMMENT:	**PNEUMATIC ACTUATORS**							

NAMEPLATE:

DUNHAM-BUSH					MFG.	**N2-64-1**			MODEL
3.0	SUPPLY FAN HP		**DAYTON**		MFG.	**2N983-0**			MODEL
	RET/EXH FAN HP				MFG.				MODEL
6000	CFM-HTG	6000	CFM-CLG	10%	MIN %OA	100%	MAX %OA	100%	% HTG AREA SERVED
COMMENT:									

COILS:

X	NONE		STM		HW		ELEC		MOD VLV	PREHEAT
	NONE	X	STM		HW		ELEC	X	MOD VLV	HEATING
X	NONE		STM		HW		ELEC		MOD VLV	REHEAT
X	NONE		STM		HW		ELEC		MOD VLV	HUMID.
	NONE	X	DX		CW			X	MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	**YES**
REQUIRED START TIME								**NO PINS**
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	1	1	1	1	1	1	1	1

CONTROLS:

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK			
SPACE SETPOINT (oF):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (oF):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Y	MAX OA (Y/N)	Y	RA (Y/N)	N	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:	Y	YES		NO					
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
BLDG: **639**
FILE: **639FC1**

AIR HANDLING UNIT SURVEY OBSERVATIONS

FC-1	AHU NO.	**GAME ROOM**	LOCATION (RM)
C.P.	REF. SYS. SERVING AHU	**GAME ROOM**	SERVES AREA

UNIT TYPE:

	SINGLE ZN	X	2-PIPE FC		4-PIPE FC		UNIT HTR		H&V
	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION		VAV
	NUMBER OF ZONES				OTHER				
	COMMENT:								

NAMEPLATE:

CLIMATE CONTROL					MFG.	8-DHU331000			MODEL
0.5	SUPPLY FAN HP				MFG.				MODEL
0.0	RET/EXH FAN HP				MFG.				MODEL
1000	CFM-HTG	1000	CFM-CLG	0%	MIN %OA		MAX %OA	50.0%	% HTG AREA SERVED
COMMENT:		**TOTAL HP AND CFM FOR TWO FAN COILS**							

COILS:

X	NONE		STM		HW		ELEC	MOD VLV	PREHEAT
	NONE	X	STM		HW		ELEC	MOD VLV	HEATING
X	NONE		STM		HW		ELEC	MOD VLV	REHEAT
X	NONE		STM		HW		EVAP MEDIA	MOD VLV	HUMID.
	NONE	X	DX		CW			MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	**NO TIMECLOCK**
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	1	1	1	1	1	1	1	1

CONTROLS:

		PNEUMATIC	X	ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:	X	SINGLE STPT		DUAL SETPNT		SETBACK			
SPACE SETPOINT (°F):	72	OCC HEAT	72	UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK	N	MIXED AIR		OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	N	MAX OA (Y/N)	Y	RA (Y/N)		EA (Y/N)	
	N	MA CONTROL	N	ECONO-DB	N	ECONO-ENT		OTHER	
DEMAND LIMIT:	N	(Y / N)							
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD
BLDG: 639

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 639CH1

REFRIGERATION EQUIPMENT SURVEY OBSERVATIONS

ACCU-1	CHILLER/COMPRESSOR NO.	MECH. ROOM	LOCATION (RM)

UNIT TYPE:

	CENTRIFUGAL WITH WATER SIDE COOLING TOWER		OTHER
	RECIPROCATING WITH WATER SIDE COOLING TOWER	X	AHU'S SERVED AHU-1
X	RECIPROCATING WITH AIR COOLED CONDENSING UNIT		
	ABSORBTION WITH WATER SIDE COOLING TOWER		
	AIR COOLED CONDENSING UNIT		

	CHW	X	DX		OTHER	

NAMEPLATE:

CHILLER	CARRIER	MFG.	38ADO24520			MODEL	P29319			SERIAL NO.
230	VOLTS	76	AMPS	3	PH	60	HZ	20.5	CAPACITY (TONS)	
TOWER		MFG.				MODEL				# OF FANS
	VOLTS		AMPS		PH		HZ		HP	
CW PUMP		MFG.				MODEL				SERIAL NO.
	VOLTS		AMPS		PH		HZ		HP	
CNW PUMP		MFG.				MODEL				SERIAL NO.
	VOLTS		AMPS		PH		HZ		HP	
COMMENTS:										

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
0	0	0	0	1	1	1	1	1	0	0	0

CONTROLS:

		PNEUMATIC	X	ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		CWS (oF)		CWR (oF)		CNWS (oF)		CNWR (oF)	
PANEL INDICATORS									
- PRESSURE		LITE-HI		LITE-LOW		GAUGES			
- TEMPERATURE		LITE-HI		LITE-LOW		GAUGES			
- OTHER									

COMMENTS: FM RADIO CONTROL

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE: **639CH2**

BLDG: **639**

REFRIGERATION EQUIPMENT SURVEY OBSERVATIONS

ACCU-2	CHILLER/COMPRESSOR NO.	OUTSIDE BLDG	LOCATION (RM)

UNIT TYPE:

	CENTRIFUGAL WITH WATER SIDE COOLING TOWER						OTHER
	RECIPROCATING WITH WATER SIDE COOLING TOWER					X	AHU'S SERVED **FC-1**
X	RECIPROCATING WITH AIR COOLED CONDENSING UNIT						
	ABSORBTION WITH WATER SIDE COOLING TOWER						
	AIR COOLED CONDENSING UNIT						
	CHW	X	DX		OTHER		

NAMEPLATE:

CHILLER --->		MFG.	**CLIMATE CONTROL**			MODEL	**NOs. NOT LEGIBLE**				SERIAL NO.
230	VOLTS	**15.2**	AMPS	**3**	PH	**60**	HZ	**3.5**	CAPACITY (TONS)		
TOWER		MFG.				MODEL					# OF FANS
	VOLTS		AMPS		PH		HZ		HP		
CW PUMP		MFG.				MODEL					SERIAL NO.
	VOLTS		AMPS		PH		HZ		HP		
CNW PUMP		MFG.				MODEL					SERIAL NO.
	VOLTS		AMPS		PH		HZ		HP		
COMMENTS:											

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
0	0	0	0	1	1	1	1	1	0	0	0

CONTROLS:

		PNEUMATIC	X	ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		CWS (oF)		CWR (oF)		CNWS (oF)		CNWR (oF)	
PANEL INDICATORS									
- PRESSURE		LITE-HI		LITE-LOW		GAUGES			
- TEMPERATURE		LITE-HI		LITE-LOW		GAUGES			
- OTHER									

COMMENTS: **FM RADIO CONTROL**

ANNUAL ENERGY SAVINGS SUMMARY
FOR BRIGADE HQ's - BUILDINGS 636, 741, 844, & 1018

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Baseline Annual Electric (MBtu)	ECO 1 - Annual Electric (MBtu)	Annual Electric Energy Savings (MBtu)	Baseline Peak Electric Demand (kW)	ECO 1 - Peak Electric Demand (kW)	Peak Electric Demand Savings (kW)	Baseline Nat. Gas Energy Savings (MBtu)	ECO 1 - Annual Nat. Gas (MBtu)	Annual Nat. Gas Energy Savings (MBtu)
636	156.79	145.29	11.50	42.40	41.60	0.80	1034.76	991.86	42.90

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 636 (SF)	Square Foot Adjust-ment Factor	Annual Electric Energy Savings (MBtu)	Adjusted Annual Electric Energy Savings* (MBtu)	Peak Electric Demand Savings (kW)	Adjusted Peak Electric Demand Savings* (kW)	Annual Nat. Gas Energy Savings (MBtu)	Adjusted Annual Nat. Gas Energy Savings* (MBtu)
741	9,236	9,236	1.000	11.50	11.50	0.80	0.80	42.90	42.90
844	9,890	9,236	1.071	11.50	12.32	0.80	0.86	42.90	45.94
1018	9,890	9,236	1.071	11.50	12.32	0.80	0.86	42.90	45.94

*Energy savings prorated on a square foot basis

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Baseline Annual Electric (MBtu)	ECO 2 - Annual Electric (MBtu)	Annual Electric Energy Savings (MBtu)	Baseline Peak Electric Demand (kW)	ECO 2 - Peak Electric Demand (kW)	Peak Electric Demand Savings (kW)	Baseline Annual Nat. Gas (MBtu)	ECO 2 - Annual Nat. Gas (MBtu)	Annual Nat. Gas Energy Savings (MBtu)
636	156.79	144.81	11.98	42.40	41.60	0.80	1034.76	989.68	45.08

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 636 (SF)	Square Foot Adjust-ment Factor	Annual Electric Energy Savings (MBtu)	Adjusted Annual Electric Energy Savings* (MBtu)	Peak Electric Demand Savings (kW)	Adjusted Peak Electric Demand Savings* (kW)	Annual Nat. Gas Energy Savings (MBtu)	Adjusted Annual Nat. Gas Energy Savings* (MBtu)
741	9,236	9,236	1.000	11.98	11.98	0.80	0.80	45.08	45.08
844	9,890	9,236	1.071	11.98	12.83	0.80	0.86	45.08	48.27
1018	9,890	9,236	1.071	11.98	12.83	0.80	0.86	45.08	48.27

*Energy savings prorated on a square foot basis

INVESTMENT COST SUMMARY
FOR BRIGADE HQ's - BUILDINGS 636, 741, 844, & 1018

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Investment Cost ($)
636	$57,789

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 636 (SF)	Square Foot Adjust-ment Factor	Investment Cost ($)	Adjusted Investment Cost ($)*
741	9,236	9,236	1.000	$57,789	$57,789
844	9,890	9,236	1.071	$57,789	$61,881
1018	9,890	9,236	1.071	$57,789	$61,881

*Investment Cost prorated on a square foot basis

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Investment Cost ($)
636	$61,061

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 636 (SF)	Square Foot Adjust-ment Factor	Investment Cost ($)	Adjusted Investment Cost ($)*
741	9,236	9,236	1.000	$61,061	$61,061
844	9,890	9,236	1.071	$61,061	$65,384
1018	9,890	9,236	1.071	$61,061	$65,384

*Investment Cost prorated on a square foot basis

LIFE CYCLE COST ANALYSIS SUMMARY

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Leonard Wood	REGION: 2 (Missouri)		PROJECT NO:	1406-011
PROJECT TITLE:	Limited Energy Study, Insulate Brick Buildings			FISCAL YEAR:	1996
ANALYSIS DATE:	02/18/96	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz

1. INVESTMENT: **BLDG 636 - INSTALL 3.5" FIBERGLASS BATT INSULATION ON WALLS**

A.	CONSTRUCTION COST	=	$51,141	
B.	SIOH COST	(7.0% of 1A) =	$3,580	
C.	DESIGN COST	(6.0% of 1A) =	$3,068	
D.	TOTAL COST	(1A +1B +1C) =	$57,789	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT	=	$0	
F.	PUBLIC UTILITY COMPANY REBATE	=	$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$57,789

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96

	ENERGY SOURCE	FUEL COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$7.33	11.50	$84	13.80	$1,162	
B.	DIST	$0.00	0	$0	0.00	$0	
C.	NAT GAS	$5.30	42.90	$227	17.76	$4,038	
D.	COAL	$0.00	0	$0	0.00	$0	
E.	ELEC. DEMAND			$59	13.47	$800	
F.	TOTAL		54.40	$371		-------->	$6,000

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1	ANNUAL MAINTENANCE	$0	$0
2		$0	$0
3		$0	$0
4	TOTAL ANNUAL DISC. SAVINGS (+) / COST	$0	$0

B. NON-RECURRING (+/-)

ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)
a. BASELINE EQUIP. REPLCMNT.				$0
b.				$0
c.				$0
d.				$0
e.				$0
f. TOTAL	$0			$0

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = $0

4.	FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-)	(2F3+3A4+(3Bf1/Economic Life))	$371
5.	SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY)	(1G/4) =	155.77
6.	TOTAL NET DISCOUNTED SAVINGS	(2F5 + 3C) =	$6,000
7.	DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (MUST HAVE SIR > 1.25 TO QUALIFY)	(6/1G) =	0.10

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	SHEET 1	OF 1
ENGINEER	E M C Engineers, Inc.	DATE PREPARED	18-Feb-96
	Denver, CO	ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST Quantity	Unit Cost	Total	LABOR COST Crew/ Worker	Hours/ Unit	Total	TOTAL
1		**BUILDING 636**								
2		**INSTALL 3.5" BATT INSULATION**								
3										
4										
5	I3-1/2I	INSTALL 3-1/2" BATT INSULATION	S.F.	3382.0	$0.18	$613	1-CARP	0.007	$622	$1,235
6	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	3150.0	$0.20	$630	2-CARP	0.017	$2,814	$3,444
7	ISW	INSTALL 2"x4" STUDDED WALL 2' OC	L.F.	3368.0	$0.24	$794	F-2	0.009	$1,670	$2,464
8	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	3382.0	$0.07	$226	1-PORD	0.01	$816	$1,042
9	R3WP	RELOCATE 3'-0" AFF WOOD PANELING	S.F.	1222.0	$0.91	$1,107	F-2	0.063	$4,243	$5,350
10	RFCU	RELOCATE FAN COIL UNIT	EA.	20.0	$20.30	$406	Q-6	5.67	$9,919	$10,325
11	REO	RELOCATE ELECTRICAL OUTLET	EA.	11.0	$7.97	$88	1-ELEC	0.896	$300	$388
12	RFE	RELOCATE FIRE EXTINGUISHER	EA.	1.0	$0.00	$0	1-CARP	0.2	$5	$5
13	RSS	RELOCATE SLOP SINK	EA.	1.0	$38.33	$38	Q-1	5.67	$319	$358
14	RTJ	RELOCATE TELEPHONE JACK	EA.	1.0	$20.03	$20	1-ELEC	0.333	$10	$30
15	RTS	RELOCATE TOILET STALL	EA.	2.0	$0.00	$0	2-CARP	3.536	$372	$372
16	RWS	RELOCATE WOOD SHELF	L.F.	2.0	$1.22	$2	1-CARP	0.12	$6	$9
17	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	L.F.	469.0	$1.14	$537	1-CARP	0.134	$1,651	$2,188
18	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	232.0	$0.84	$195	2-CARP	0.02	$244	$439
19	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	232.0	$1.83	$425	2-TILE	0.084	$944	$1,369
20	RDR	RELOCATE DRAPERIES, WINDOW SHADES	EA.	80.0	$0.00	$0	L-2	0.744	$2,762	$2,762
21										
22										
23										
24										
25										
26										
27		**SUBTOTAL**				$5,081			$26,698	$31,779
28	DIFF	DIFFICULTLY FACTOR			5%				$1,335	$1,335
29		**SUBTOTAL**				$5,081			$28,033	$33,114
30	OH	OVERHEAD			17%	$864			$4,766	$5,629
31		**SUBTOTAL**				$5,945			$32,798	$38,743
32	PRO	PROFIT			10%	$594			$3,280	$3,874
33		**SUBTOTAL**				$6,539			$36,078	$42,617
34	CONT	CONTINGENCY			20%	$1,308			$7,216	$8,523
35	**TOTAL COST**					$7,847			$43,294	$51,141

LIFE CYCLE COST ANALYSIS SUMMARY

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Leonard Wood	REGION: 2 (Missouri)		PROJECT NO:	1406-011
PROJECT TITLE:	Limited Energy Study, Insulate Brick Buildings			FISCAL YEAR:	1996
ANALYSIS DATE:	02/18/96	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz

1. INVESTMENT: **BLDG 636 - INSTALL 1.5" RIGID INSULATION ON WALLS**

A.	CONSTRUCTION COST	=	$54,036	
B.	SIOH COST	(7.0% of 1A) =	$3,783	
C.	DESIGN COST	(6.0% of 1A) =	$3,242	
D.	TOTAL COST	(1A +1B +1C) =	$61,061	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT =		$0	
F.	PUBLIC UTILITY COMPANY REBATE =		$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$61,061

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96

	ENERGY SOURCE	FUEL COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$7.33	11.98	$88	13.80	$1,211	
B.	DIST	$0.00	0	$0	0.00	$0	
C.	NAT GAS	$5.30	45.08	$239	17.76	$4,243	
D.	COAL	$0.00	0	$0	0.00	$0	
E.	ELEC. DEMAND			$59	13.47	$800	
F.	TOTAL		57.06	$386		-------->	$6,254

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1	ANNUAL MAINTENANCE	$0	$0
2		$0	$0
3		$0	$0
4	TOTAL ANNUAL DISC. SAVINGS (+) / COST	$0	$0

B. NON-RECURRING (+/-)

	ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)	
a.	BASELINE EQUIP. REPLCMNT.				$0	
b.					$0	
c.					$0	
d.					$0	
e.					$0	
f.	TOTAL	$0			$0	

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = $0

4.	FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-)	(2F3 + 3A4 + (3Bf1/Economic Life))	$386
5.	SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY)	(1G/4) =	158.17
6.	TOTAL NET DISCOUNTED SAVINGS	(2F5 + 3C) =	$6,254
7.	DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (MUST HAVE SIR > 1.25 TO QUALIFY)	(6/1G) =	0.10

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	SHEET 1	OF 1
ENGINEER	E M C Engineers, Inc.	DATE PREPARED	18-Feb-96
	Denver, CO	ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST Quantity	Unit Cost	Total	LABOR COST Crew/ Worker	Hours/ Unit	Total	TOTAL
1		**BUILDING 636**								
2		**INSTALL 1.5" RIGID INSULATION ON WALLS**								
3										
4										
5	I1-1/2RI	INSTALL 1-1/2" RIGID INSULATION	S.F.	3382.0	$0.59	$2,000	1-CARP	0.008	$711	$2,711
6	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	3150.0	$0.20	$631	2-CARP	0.017	$2,814	$3,445
7	IFS	INSTALL 3/4"x2" FURRING STRIPS	L.F.	1340.0	$0.19	$256	1-CARP	0.016	$563	$819
8	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	3382.0	$0.07	$226	1-PORD	0.01	$816	$1,042
9	R3WP	RELOCATE 3'-0" AFF WOOD PANELING	S.F.	1222.0	$0.91	$1,107	F-2	0.063	$4,243	$5,350
10	RFCU	RELOCATE FAN COIL UNIT	EA.	20.0	$20.30	$406	Q-6	5.67	$9,919	$10,325
11	REO	RELOCATE ELECTRICAL OUTLET	EA.	11.0	$7.97	$88	1-ELEC	0.896	$300	$388
12	RFE	RELOCATE FIRE EXTINGUISHER	EA.	1.0	$0.00	$0	1-CARP	0.2	$5	$5
13	RSS	RELOCATE SLOP SINK	EA.	1.0	$38.33	$38	Q-1	5.67	$319	$358
14	RTJ	RELOCATE TELEPHONE JACK	EA.	1.0	$20.03	$20	1-ELEC	0.333	$10	$30
15	RTS	RELOCATE TOILET STALL	EA.	2.0	$0.00	$0	2-CARP	3.536	$372	$372
16	RWS	RELOCATE WOOD SHELF	L.F.	2.0	$1.22	$2	1-CARP	0.12	$6	$9
17	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	L.F.	469.0	$1.14	$537	1-CARP	0.134	$1,651	$2,188
18	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	232.0	$0.84	$195	2-CARP	0.02	$244	$439
19	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	232.0	$1.83	$425	2-TILE	0.084	$944	$1,369
20	RDR	RELOCATE DRAPERIES, WINDOW SHADES	EA.	80.0	$0.00	$0	L-2	0.744	$2,762	$2,762
21										
22										
23										
24										
25										
26										
27		**SUBTOTAL**				$5,932			$25,679	$31,611
28	DIFF	DIFFICULTLY FACTOR			5%				$1,284	$1,284
29		**SUBTOTAL**				$5,932			$26,963	$32,895
30	OH	OVERHEAD			17%	$1,008			$4,584	$5,592
31		**SUBTOTAL**				$6,940			$31,547	$38,487
32	OH	OVERHEAD			17%	$1,180			$5,363	$6,543
33		**SUBTOTAL**				$8,120			$36,910	$45,030
34	CONT	CONTINGENCY			20%	$1,624			$7,382	$9,006
35	**TOTAL COST**					$9,744			$44,292	$54,036

E M C ENGINEERS, INC.

DATE: Feb-96

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

BY: DMS

CLIENT CONTRACT NO.: DACA 01-94D-0033

JOB: 1406.011

LOCATION: FT LEONARD WOOD, MO.

CHK: AJN

FILE: 636BHL

BUILDING HEATING LOAD CALCULATION SHEET

BLDG NO: 636 BLDG NAME: BRIGADE HEADQUARTERS

BLDG FUNCTION: BRIGADE HEADQUARTERS

FLOOR AREA: (SQ. FT) 9,044 # FLOORS 3

SLAB PERIMETER: (FT) 235

I. AREAS: ([ ] FIELD VERIFIED ELEVATION PLANS)

		NORTH	SOUTH	EAST	WEST	TOTAL
WALLS, GROSS	(SQ. FT)	722	722	1,507	1,907	4,858
GLASS	(SQ. FT)	159	174	495	497	1,325
PERSONNEL DOOR	(SQ. FT)	49		23	80	152
INSULATED PANEL	(SQ. FT)	0	0	0	0	0
WALLS, NET	(SQ. FT)	514	548	990	1,330	3,382
ROOF AREA (OR CEILING AREA IF ATTIC IS UNCONDITIONED)					(SQ. FT)	3,417
INSULATED PANEL	(SQ. FT)	0	PERSONNEL DOOR		(SQ. FT)	152
BASEMENT WALLS	(SQ. FT)	0	0	0	0	0

II. CONSTRUCTION: ([ ] FIELD VERIFIED WALL, ROOF, WINDOW, DOOR TYPES)

WALLS: (SKETCH CROSS SECTION OF WALL)		COMPONENTS	R-VALUE
	1.	OUTSIDE AIR FILM	0.17
	2.	4" FACE BRICK	0.43
	3.	AIR SPACE	0.91
	4.	6" CMU	1.89
	5.		
	6.		
	7.	INSIDE AIR FILM	0.68
		TOTAL R-WALL =	4.08
		U=1/R	0.245

ROOF: (SKETCH CROSS SECTION OF ROOF)		COMPONENTS	R-VALUE
	1.	OUTSIDE AIR FILM	0.17
	2.	BUILT UP ROOF	0.40
	3.	3" RIGID INSUL	12.00
	4.	6.5" CONC. SLAB	1.30
	5.	CEILING SPACE	1.00
	6.	6" FB BATT INSUL	19.00
	7.	ACOUSTIC TILE	1.35
	8.	INSIDE AIR FILM	0.68
		TOTAL R-ROOF =	35.73
		U=1/R	0.028

GLASS TYPE:	PPG 'PENNVERNON' C.L. TWNDV, SSA, .88 S.C.	R-GLASS	1.61
SLAB TYPE FLOOR:	CONCRETE	SLF	0.87
BASEMENT TYPE:	NONE	R-BASEM.	0.00
INSULATED PANEL:	NONE	R-PANEL	0.00
PERSONNEL DOOR TYPE:	METAL	R-PDOOR	2.38

III. INFILTRATION:

TIGHT WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
AVG. WALL H/M/L (SQ.FT.)	L	4006	X CFM / SQ.FT.	0.092	=	369
LEAKY WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
DOOR OPENINGS / HR - SINGLE DOOR		20	X CFM /OPENING /HR	1.600	=	32
DOOR OPENINGS / HR - DOUBLE DOORS		25	X CFM /OPENING /HR	1.385	=	35
			TOTAL INFILTRATION (CFM)		=	435

UA PANEL	PANEL AREA	0	X PANEL "U"	0.000	=	0
UA PDOOR	PDOOR AREA	152	X DOOR "U"	0.420	=	64
UA WALL	WALL AREA	3,382	X WALL "U"	0.245	=	828
UA ROOF	ROOF AREA	3,417	X ROOF "U"	35.730	=	122,089
UA GLASS	GLASS AREA	1,325	X GLASS "U"	0.621	=	823
UA SLAB	SLAB PERIM.	235	X SLF	0.870	=	204
UA BASEM.	B-WALL AREA	0	X BASE. "U"	0.000	=	0
INFILTRATION	CFM	435	X A. T. F.	1.035	=	450
			TOTAL UA (BTU/HR°F)			124,459

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY DMS
CHECKED BY: AJN
FILE: 636
BLDG: 636 ZONE:

Rates of Heat Gain from Occupants of Conditioned Spaces

Zone No.	No. of People	Activity Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)
0	30	4	Seated, light work, typing	Offices, hotels, apts	250	200	7,500	6,000
TOTA	30					TOTAL	7,500	6,000

Peak Wattage Value for Lights

Zone No.	No. of Fixtures	Fixture Type	Description	Watts/Fixture	Total Wattage
0	210	2	Fluorescent, 2 - 40w lamps, 16w ballast (1x4 ft. fixture)	96	20,160
	50	20	Incandescent - 100w	100	5,000
TOTA	260			TOTAL	25,160

Peak Value for Internal Gains

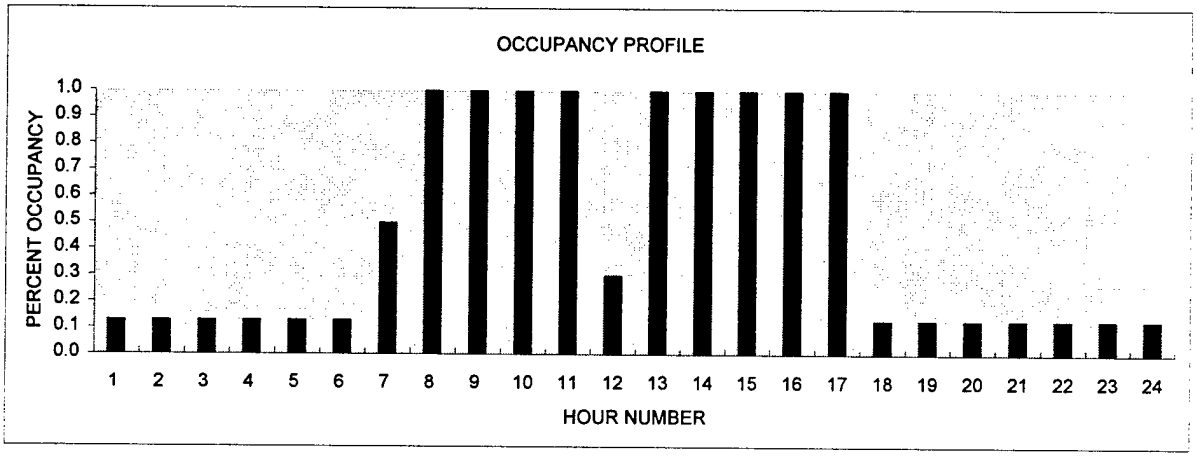
Zone No.	No. of Equipment	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattage	Total (BTU)
0	17	3	Microcomputer	350	91%	5,950	20,307
	4	24	Coffee Maker	1,500	30%	6,000	20,478
	1	49	Radio	71	10%	71	242
	2	70	Water Cooler	700	50%	1,400	4,778
	13	5	Printer (laser)	870	34%	11,310	38,601
	2	25	Cold Food/Beverage	1,535	50%	3,070	10,478
	3	10	Copiers (Large)	1,570	20%	4,710	16,075
	5	12	Typewriter	100	10%	500	1,707
	1	56	Refrigerator/Freezer(Frostless 14 cu. ft.)	615	35%	615	2,099
				TOTAL	43%	33,626	114,766

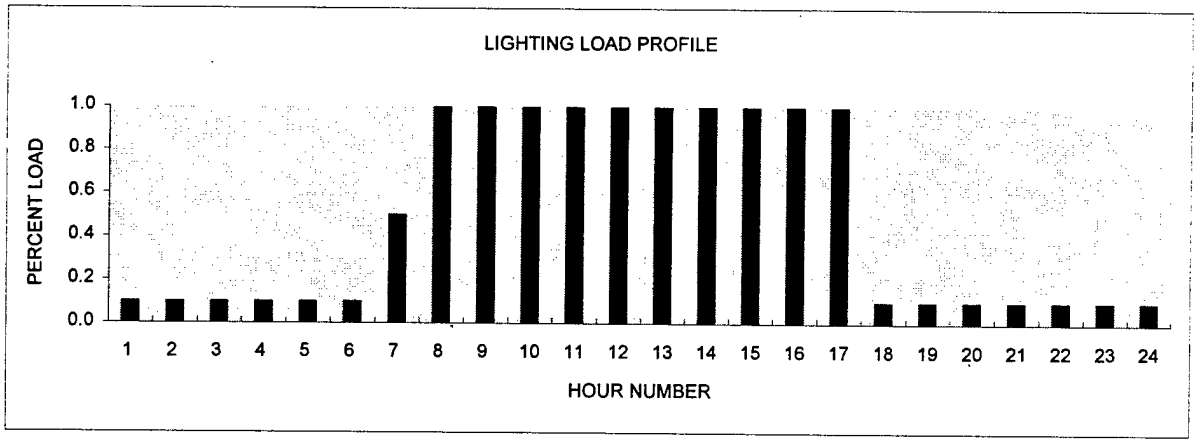
E M C Engineers, Inc.

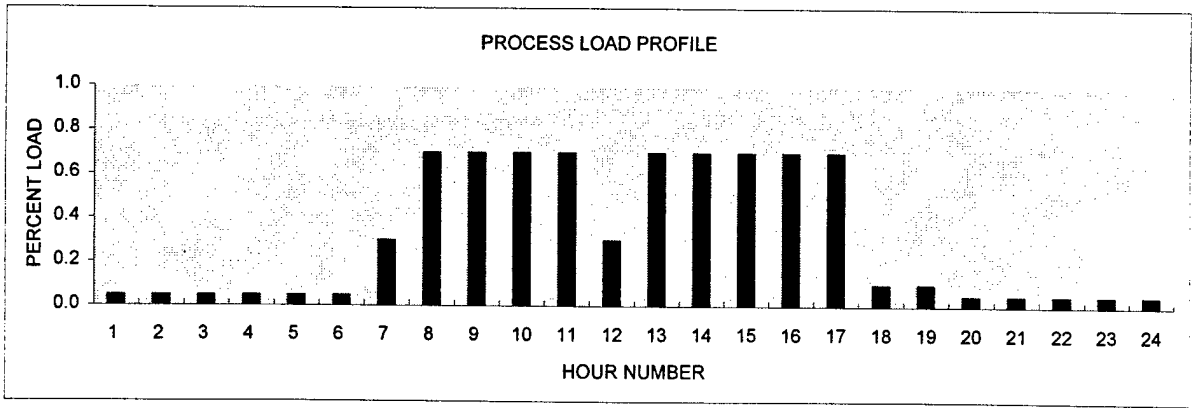
PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 636
BLDG: 636
ZONE:

BLDG TYPE	BLDG FUNCTION	TYPE OF PROFILE	HOUR NUMBER																							
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
8	Brigade HQ	OCCUPANCY	0.1	0.1	0.1	0.1	0.1	0.1	0.5	1.0	1.0	1.0	1.0	0.3	1.0	1.0	1.0	1.0	1.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		LIGHTING	0.1	0.1	0.1	0.1	0.1	0.1	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		PROCESS	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.7	0.7	0.7	0.7	0.3	0.7	0.7	0.7	0.7	0.7	0.1	0.1	0.1	0.1	0.1	0.1	0.1







V:\1406.011\COLECTD\FIELD\PLE\636Z1.XLS

BLDG 636 - BRIGADE HEADQUARTERS BASELINE (FT. LEONARD WOOD, MO)

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 6.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******

FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 72345.600000
FLOOR AREA (SQFT) 9044.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 828500.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -448500.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 90430.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 763.000000
INFILTRATION PROFILE

.600	.600	.600	.600	.600	.600	.600	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	.600	.600	.600	.600	.600	.600	.600

A FACTOR IN INFILTRATION EQUATION (CINA) 2.300000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 17905.540000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 331.250000
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 0.000000E+00
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 63.700000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 7.856054E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 7.856054E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	548.2	1329.2	514.1	990.0
WINDOW AREA SQFT (AWND)	158.9	497.2	173.8	495.0
WINDOW HEIGHT FT (WNDH)	5.5	5.5	5.5	5.5
WINDOW WIDTH FT (WNDW)	28.9	90.4	31.6	90.0
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.245	.245	.245
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01837	.01837	.01837	.01837
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00003	.00003	.00003	.00003
N=2	.00283	.00283	.00283	.00283
N=3	.01017	.01017	.01017	.01017
N=4	.00498	.00498	.00498	.00498
N=5	.00037	.00037	.00037	.00037
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	-.07415	-.07415	-.07415	-.07415
N=5	.00212	.00212	.00212	.00212
N=6	********	********	********	********

ROOF AREA SQFT (AROF) 3416.750000
ROOF U VALUE BTU/HR-SQFT-F (URF) 2.800000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.489216E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .137E-05 .206E-04 .679E-04 .508E-04 .961E-05
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 3.800000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	8.	38814.	7500.	6000.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.150	.150	70.0	76.0
2	.100	.000	.150	.150	70.0	76.0
3	.100	.000	.150	.150	70.0	76.0
4	.100	.000	.150	.150	70.0	76.0
5	.100	.000	.150	.150	70.0	76.0
6	.100	.000	.150	.150	70.0	76.0
7	.500	.100	.500	.500	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
  9        1.000      .900      1.000      1.000        70.0        76.0
 10        1.000      .900      1.000      1.000        70.0        76.0
 11        1.000      .800      1.000      1.000        70.0        76.0
 12        1.000      .700       .300       .300        70.0        76.0
 13        1.000      .800      1.000      1.000        70.0        76.0
 14        1.000      .900      1.000      1.000        70.0        76.0
 15        1.000      .900      1.000      1.000        70.0        76.0
 16        1.000      .900      1.000      1.000        70.0        76.0
 17        1.000      .800      1.000      1.000        70.0        76.0
 18         .100      .200       .150       .150        70.0        76.0
 19         .100      .000       .150       .150        70.0        76.0
 20         .100      .000       .150       .150        70.0        76.0
 21         .100      .000       .150       .150        70.0        76.0
 22         .100      .000       .150       .150        70.0        76.0
 23         .100      .000       .150       .150        70.0        76.0
 24         .100      .000       .150       .150        70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)    13450.000000
ECONOMIZER HIGH TEMP LIMIT F        65.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)    0.000000E+00
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.500000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  828500.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   994200.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)            3
COOLING PLANT RATED OUTPUT BTU (CFLOT)   448500.000000
COOLING PLANT RATED INPUT BTU (CFLIN)   112125.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 636 - BRIGADE HEADQUARTERS BASELINE (FT. LEONARD WOOD, MO)

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	19.	0.	0.	0.	0.	0.	0.	0.
	-110.	LOSS		0.	-2.	-7.	-18.	-20.	-110.	0.
FEB	.12	GAIN	24.65	.00	.00	.00	.03	.00	.00	.03
	-86.09	LOSS		-.42	-1.45	-7.57	-13.25	-17.46	-94.96	.00
MAR	4.85	GAIN	30.52	.00	.00	.00	.73	.00	.00	.40
	-71.09	LOSS		-.37	-1.35	-8.45	-10.52	-16.22	-87.97	.00
APR	22.49	GAIN	32.07	.00	.01	.00	2.63	.09	.40	2.45
	-32.56	LOSS		-.21	-.79	-7.24	-5.00	-9.55	-50.94	.00
MAY	49.77	GAIN	35.09	.02	.03	.00	5.11	.30	1.38	10.41
	-11.34	LOSS		-.09	-.43	-5.51	-1.65	-4.95	-28.49	.00
JUN	97.29	GAIN	35.00	.04	.08	.00	7.60	.91	4.16	36.93
	-1.48	LOSS		-.03	-.18	-3.17	-.27	-2.09	-9.17	.00
JUL	127.	GAIN	36.	0.	0.	0.	10.	2.	11.	50.
	0.	LOSS		0.	0.	-1.	0.	-1.	-6.	0.
AUG	119.	GAIN	32.	0.	0.	0.	8.	2.	8.	50.
	-1.	LOSS		0.	0.	0.	0.	-2.	-7.	0.
SEP	71.22	GAIN	27.30	.02	.07	.31	4.67	.90	4.21	27.27
	-9.77	LOSS		-.09	-.35	-.14	-1.70	-4.16	-22.70	.00
OCT	21.10	GAIN	22.78	.00	.01	.07	1.28	.13	.58	4.66
	-28.07	LOSS		-.23	-.76	-.81	-5.63	-8.87	-47.48	.00
NOV	6.27	GAIN	18.08	.00	.00	.00	.26	.00	.00	.93
	-55.33	LOSS		-.33	-1.10	-2.57	-10.27	-12.87	-67.55	.00
DEC	0.	GAIN	17.	0.	0.	0.	0.	0.	0.	0.
	-107.	LOSS		0.	-2.	-5.	-18.	-20.	-105.	0.
TOT	519.	GAIN	329.	0.	1.	1.	40.	6.	29.	182.
	-514.	LOSS		-3.	-10.	-49.	-84.	-119.	-637.	0.

MAX HEATING LOAD= -406652. BTUH ON DEC 18 HOUR 4 AMBIENT TEMP 1.
MAX COOLING LOAD= 423326. BTUH ON JUL 27 HOUR 14 AMBIENT TEMP 91.

ZONE UA BTU/HR-F 1906.1

BLDG 636 - BRIGADE HEADQUARTERS BASELINE (FT. LEONARD WOOD, MO)

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL INTERNAL HEAT GAIN MILLION BTU
JAN	70.	77.		2	14	58.	2.77	24.70	6.01	27.30
			69.	27	6	4.				
FEB	71.	78.		26	13	59.	2.47	22.04	5.43	24.42
			69.	2	6	14.				
MAR	72.	78.		12	13	74.	2.73	24.35	6.01	26.99
			69.	3	6	15.				
APR	73.	78.		24	14	81.	2.63	23.46	5.82	26.03
			69.	9	5	30.				
MAY	74.	78.		21	11	77.	2.77	24.70	6.01	27.30
			70.	11	5	39.				
JUN	76.	78.		22	13	83.	2.63	23.46	5.82	26.03
			70.	17	5	56.				
JUL	76.	78.		26	13	93.	2.73	24.35	6.01	26.99
			70.	10	5	57.				
AUG	76.	78.		30	12	86.	2.77	24.70	6.01	27.30
			70.	25	5	52.				
SEP	75.	78.		10	13	87.	2.59	23.10	5.82	25.73
			70.	15	6	39.				
OCT	73.	78.		2	13	79.	2.77	24.70	6.01	27.30
			70.	28	6	33.				
NOV	71.	78.		7	14	73.	2.67	23.82	5.82	26.34
			69.	3	6	18.				
DEC	70.	77.		12	14	61.	2.69	23.99	6.01	26.69
			69.	18	6	0.				
YEAR							32.21	287.38	70.81	318.44

BLDG 636 - BRIGADE HEADQUARTERS BASELINE (FT. LEONARD WOOD, MO)

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	672	32	0	0	-.3971E+06	.0000
FEB	544	53	0	0	-.3252E+06	.1200E+06
MAR	523	110	0	0	-.3278E+06	.1972E+06
APR	342	231	0	0	-.2093E+06	.2405E+06
MAY	235	347	0	0	-.1482E+06	.3001E+06
JUN	66	414	0	0	-.5342E+05	.4003E+06
JUL	26	548	0	0	-.4176E+05	.4233E+06
AUG	28	528	0	0	-.6646E+05	.3951E+06
SEP	152	378	0	0	-.1349E+06	.4048E+06
OCT	350	233	0	0	-.1928E+06	.3096E+06
NOV	503	107	0	0	-.2723E+06	.2195E+06
DEC	671	18	0	0	-.4067E+06	.8655E+05
YEAR	4112	2999	0	0	-.4067E+06	.4233E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	191.93	.00	2.77	24.70	1.76	27.30	10.8
FEB	151.88	.01	2.47	22.04	1.59	24.42	23.2
MAR	135.07	.49	2.73	24.35	1.76	26.99	29.1
APR	76.49	2.18	2.63	23.46	1.71	26.03	32.0
MAY	45.93	4.62	2.77	24.70	1.76	27.30	35.6
JUN	12.53	8.40	2.63	23.46	1.71	26.03	41.1
JUL	4.94	10.94	2.73	24.35	1.76	26.99	42.4
AUG	5.32	10.36	2.77	24.70	1.76	27.30	40.9
SEP	29.71	6.26	2.59	23.10	1.71	25.73	41.4
OCT	73.26	2.02	2.77	24.70	1.76	27.30	36.2
NOV	119.48	.63	2.67	23.82	1.71	26.34	30.6
DEC	188.23	.03	2.69	23.99	1.76	26.69	16.9
YEAR	1034.76	45.94	32.21	287.38	20.75	318.44	42.4

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 183508. BTU/(SQFT-YEAR)

BLDG 636 - BRIGADE HEADQUARTERS BASELINE (FT. LEONARD WOOD, MO)

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.3971E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.1200E+06	-.3252E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1972E+06	-.3278E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.2405E+06	-.2093E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.3001E+06	-.1482E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.4003E+06	-.5342E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.4233E+06	-.4176E+05
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.3951E+06	-.6646E+05
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.4048E+06	-.1349E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.3096E+06	-.1928E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.2195E+06	-.2723E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.8655E+05	-.4067E+06

BLDG 636 - BRIGADE HQ ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 6.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 72345.600000
FLOOR AREA (SQFT) 9044.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 828500.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -448500.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 90430.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 763.000000
INFILTRATION PROFILE

.600	.600	.600	.600	.600	.600	.600	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	.600	.600	.600	.600	.600	.600	.600

A FACTOR IN INFILTRATION EQUATION (CINA) 2.300000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 17905.540000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 331.250000
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 0.000000E+00
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 63.700000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 7.856054E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 7.856054E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	548.2	1329.2	514.1	990.0
WINDOW AREA SQFT (AWND)	158.9	497.2	173.8	495.0
WINDOW HEIGHT FT (WNDH)	5.5	5.5	5.5	5.5
WINDOW WIDTH FT (WNDW)	28.9	90.4	31.6	90.0
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.064	.064	.064	.064
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00176	.00176	.00176	.00176
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00016	.00016	.00016	.00016
N=3	.00086	.00086	.00086	.00086
N=4	.00066	.00066	.00066	.00066
N=5	.00008	.00008	.00008	.00008
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	-.16643	-.16643	-.16643	-.16643
N=5	.00728	.00728	.00728	.00728
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 3416.750000
ROOF U VALUE BTU/HR-SQFT-F (URF) 2.800000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.489216E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .137E-05 .206E-04 .679E-04 .508E-04 .961E-05
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 3.800000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	8.	38814.	7500.	6000.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.150	.150	70.0	76.0
2	.100	.000	.150	.150	70.0	76.0
3	.100	.000	.150	.150	70.0	76.0
4	.100	.000	.150	.150	70.0	76.0
5	.100	.000	.150	.150	70.0	76.0
6	.100	.000	.150	.150	70.0	76.0
7	.500	.100	.500	.500	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
  9        1.000      .900      1.000      1.000        70.0        76.0
 10        1.000      .900      1.000      1.000        70.0        76.0
 11        1.000      .800      1.000      1.000        70.0        76.0
 12        1.000      .700       .300       .300        70.0        76.0
 13        1.000      .800      1.000      1.000        70.0        76.0
 14        1.000      .900      1.000      1.000        70.0        76.0
 15        1.000      .900      1.000      1.000        70.0        76.0
 16        1.000      .900      1.000      1.000        70.0        76.0
 17        1.000      .800      1.000      1.000        70.0        76.0
 18         .100      .200       .150       .150        70.0        76.0
 19         .100      .000       .150       .150        70.0        76.0
 20         .100      .000       .150       .150        70.0        76.0
 21         .100      .000       .150       .150        70.0        76.0
 22         .100      .000       .150       .150        70.0        76.0
 23         .100      .000       .150       .150        70.0        76.0
 24         .100      .000       .150       .150        70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)    13450.000000
ECONOMIZER HIGH TEMP LIMIT F        65.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)    0.000000E+00
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.500000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  828500.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   994200.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906      1.00      1.00
CHILLER TYPE (ITYPCH)            3
COOLING PLANT RATED OUTPUT BTU (CFLOT)   448500.000000
COOLING PLANT RATED INPUT BTU (CFLIN)   112125.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 636 - BRIGADE HQ ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	19.	0.	0.	0.	0.	0.	0.	0.
	-98.	LOSS		-1.	-2.	-7.	-5.	-20.	-110.	0.
FEB	.12	GAIN	24.65	.00	.00	.00	.00	.00	.00	.03
	-77.74	LOSS		-.42	-1.45	-7.60	-3.49	-17.53	-96.23	.00
MAR	4.80	GAIN	30.52	.00	.00	.00	.05	.00	.00	.40
	-65.20	LOSS		-.37	-1.35	-8.48	-2.60	-16.29	-89.27	.00
APR	21.69	GAIN	32.07	.00	.01	.00	.41	.09	.40	2.37
	-31.05	LOSS		-.21	-.79	-7.23	-1.09	-9.54	-51.87	.00
MAY	47.53	GAIN	35.09	.02	.03	.00	1.12	.30	1.38	9.91
	-11.71	LOSS		-.09	-.42	-5.46	-.19	-4.83	-28.28	.00
JUN	90.54	GAIN	35.00	.04	.08	.00	1.96	.91	4.16	34.07
	-1.79	LOSS		-.03	-.16	-3.08	.00	-1.89	-8.31	.00
JUL	115.	GAIN	36.	0.	0.	0.	3.	2.	11.	44.
	0.	LOSS		0.	0.	-1.	0.	-1.	-6.	0.
AUG	108.	GAIN	32.	0.	0.	0.	2.	2.	8.	45.
	-1.	LOSS		0.	0.	0.	0.	-1.	-7.	0.
SEP	66.16	GAIN	27.30	.02	.07	.33	1.09	.90	4.21	24.63
	-9.42	LOSS		-.09	-.34	-.13	-.25	-4.08	-22.72	.00
OCT	20.79	GAIN	22.78	.00	.01	.07	.19	.13	.58	4.49
	-25.89	LOSS		-.23	-.76	-.81	-1.31	-8.87	-48.68	.00
NOV	6.35	GAIN	18.08	.00	.00	.00	.01	.00	.00	.91
	-49.36	LOSS		-.33	-1.10	-2.60	-2.62	-12.94	-68.77	.00
DEC	0.	GAIN	17.	0.	0.	0.	0.	0.	0.	0.
	-94.	LOSS		-1.	-2.	-5.	-5.	-20.	-106.	0.
TOT	482.	GAIN	329.	0.	1.	1.	10.	6.	29.	166.
	-466.	LOSS		-3.	-10.	-49.	-21.	-119.	-643.	0.

MAX HEATING LOAD= -368512. BTUH ON DEC 18 HOUR 4 AMBIENT TEMP 1.
MAX COOLING LOAD= 408643. BTUH ON JUL 3 HOUR 12 AMBIENT TEMP 86.

ZONE UA BTU/HR-F 1294.0

BLDG 636 - BRIGADE HQ ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	71.	77.		2	14	58.	2.77	24.70	6.01	27.30
			69.	27	6	4.				
FEB	71.	78.		26	13	59.	2.47	22.04	5.43	24.42
			69.	2	3	15.				
MAR	72.	78.		12	13	74.	2.73	24.35	6.01	26.99
			69.	3	6	15.				
APR	73.	78.		30	12	80.	2.63	23.46	5.82	26.03
			70.	14	5	30.				
MAY	74.	78.		21	11	77.	2.77	24.70	6.01	27.30
			70.	11	4	38.				
JUN	75.	78.		22	13	83.	2.63	23.46	5.82	26.03
			70.	16	4	55.				
JUL	76.	78.		26	13	93.	2.73	24.35	6.01	26.99
			70.	10	5	57.				
AUG	76.	78.		30	12	86.	2.77	24.70	6.01	27.30
			70.	25	5	52.				
SEP	75.	78.		3	11	90.	2.59	23.10	5.82	25.73
			70.	15	6	39.				
OCT	73.	78.		2	13	79.	2.77	24.70	6.01	27.30
			70.	28	5	31.				
NOV	72.	78.		7	14	73.	2.67	23.82	5.82	26.34
			70.	3	4	17.				
DEC	71.	77.		12	14	61.	2.69	23.99	6.01	26.69
			69.	18	4	1.				
YEAR							32.21	287.38	70.81	318.44

BLDG 636 - BRIGADE HQ ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	652	35	0	0	-.3641E+06	.0000
FEB	528	69	0	0	-.2971E+06	.1230E+06
MAR	519	127	0	0	-.3005E+06	.1996E+06
APR	354	244	0	0	-.1906E+06	.2396E+06
MAY	265	334	0	0	-.1350E+06	.3022E+06
JUN	89	376	0	0	-.5135E+05	.3856E+06
JUL	32	482	0	0	-.3844E+05	.4086E+06
AUG	33	470	0	0	-.6087E+05	.3883E+06
SEP	157	341	0	0	-.1214E+06	.4024E+06
OCT	349	239	0	0	-.1767E+06	.3048E+06
NOV	478	118	0	0	-.2449E+06	.2207E+06
DEC	649	26	0	0	-.3685E+06	.9713E+05
YEAR	4105	2861	0	0	-.3685E+06	.4086E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	177.82	.00	2.77	24.70	1.76	27.30	10.8
FEB	141.87	.01	2.47	22.04	1.59	24.42	23.5
MAR	129.05	.48	2.73	24.35	1.76	26.99	29.3
APR	76.94	2.11	2.63	23.46	1.71	26.03	31.9
MAY	51.36	4.42	2.77	24.70	1.76	27.30	35.7
JUN	16.90	7.80	2.63	23.46	1.71	26.03	40.4
JUL	6.08	9.88	2.73	24.35	1.76	26.99	41.6
AUG	6.27	9.42	2.77	24.70	1.76	27.30	40.5
SEP	30.31	5.78	2.59	23.10	1.71	25.73	41.3
OCT	71.35	1.98	2.77	24.70	1.76	27.30	35.9
NOV	110.31	.64	2.67	23.82	1.71	26.34	30.7
DEC	173.60	.04	2.69	23.99	1.76	26.69	17.9
YEAR	991.86	42.57	32.21	287.38	20.75	318.44	41.6

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 177493. BTU/(SQFT-YEAR)

BLDG 636 - BRIGADE HQ ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.3641E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.1230E+06	-.2971E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1996E+06	-.3005E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.2396E+06	-.1906E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.3022E+06	-.1350E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.3856E+06	-.5135E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.4086E+06	-.3844E+05
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.3883E+06	-.6087E+05
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.4024E+06	-.1214E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.3048E+06	-.1767E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.2207E+06	-.2449E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.9713E+05	-.3685E+06

BLDG 636 - BRIGADE HQ ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 6.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 72345.600000
FLOOR AREA (SQFT) 9044.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 828500.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -448500.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 90430.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 763.000000
INFILTRATION PROFILE

.600	.600	.600	.600	.600	.600	.600	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	.600	.600	.600	.600	.600	.600	.600

A FACTOR IN INFILTRATION EQUATION (CINA) 2.300000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 17905.540000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 331.250000
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 0.000000E+00
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 63.700000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 7.856054E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 7.856054E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	548.2	1329.2	514.1	990.0
WINDOW AREA SQFT (AWND)	158.9	497.2	173.8	495.0
WINDOW HEIGHT FT (WNDH)	5.5	5.5	5.5	5.5
WINDOW WIDTH FT (WNDW)	28.9	90.4	31.6	90.0
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.055	.055	.055	.055
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00174	.00174	.00174	.00174
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00019	.00019	.00019	.00019
N=3	.00089	.00089	.00089	.00089
N=4	.00059	.00059	.00059	.00059
N=5	.00007	.00007	.00007	.00007
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	-.14508	-.14508	-.14508	-.14508
N=5	.00613	.00613	.00613	.00613
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 3416.750000
ROOF U VALUE BTU/HR-SQFT-F (URF) 2.800000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.489216E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .137E-05 .206E-04 .679E-04 .508E-04 .961E-05
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 3.800000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	8.	38814.	7500.	6000.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.150	.150	70.0	76.0
2	.100	.000	.150	.150	70.0	76.0
3	.100	.000	.150	.150	70.0	76.0
4	.100	.000	.150	.150	70.0	76.0
5	.100	.000	.150	.150	70.0	76.0
6	.100	.000	.150	.150	70.0	76.0
7	.500	.100	.500	.500	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
  9        1.000      .900     1.000     1.000        70.0        76.0
 10        1.000      .900     1.000     1.000        70.0        76.0
 11        1.000      .800     1.000     1.000        70.0        76.0
 12        1.000      .700      .300      .300        70.0        76.0
 13        1.000      .800     1.000     1.000        70.0        76.0
 14        1.000      .900     1.000     1.000        70.0        76.0
 15        1.000      .900     1.000     1.000        70.0        76.0
 16        1.000      .900     1.000     1.000        70.0        76.0
 17        1.000      .800     1.000     1.000        70.0        76.0
 18         .100      .200      .150      .150        70.0        76.0
 19         .100      .000      .150      .150        70.0        76.0
 20         .100      .000      .150      .150        70.0        76.0
 21         .100      .000      .150      .150        70.0        76.0
 22         .100      .000      .150      .150        70.0        76.0
 23         .100      .000      .150      .150        70.0        76.0
 24         .100      .000      .150      .150        70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)    13450.000000
ECONOMIZER HIGH TEMP LIMIT F        65.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)    0.000000E+00
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.500000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)   828500.000000
HEATING PLANT RATED INPUT BTU (HFLIN)    994200.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)            3
COOLING PLANT RATED OUTPUT BTU (CFLOT)    448500.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    112125.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BEACON Energy Analysis By EMC Engineers, Inc. 636RGD.I

BLDG 636 - BRIGADE HQ ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	19.	0.	0.	0.	0.	0.	0.	0.
	-98.	LOSS		-1.	-2.	-7.	-4.	-20.	-111.	0.
FEB	.12	GAIN	24.65	.00	.00	.00	.00	.00	.00	.03
	-77.34	LOSS		-.42	-1.45	-7.60	-2.99	-17.53	-96.31	.00
MAR	4.82	GAIN	30.52	.00	.00	.00	.05	.00	.00	.40
	-64.94	LOSS		-.37	-1.35	-8.48	-2.25	-16.29	-89.34	.00
APR	21.68	GAIN	32.07	.00	.01	.00	.37	.09	.40	2.37
	-30.99	LOSS		-.21	-.79	-7.23	-.95	-9.54	-51.92	.00
MAY	47.48	GAIN	35.09	.02	.03	.00	.97	.30	1.38	9.91
	-11.78	LOSS		-.09	-.42	-5.46	-.17	-4.83	-28.27	.00
JUN	90.30	GAIN	35.00	.04	.08	.00	1.69	.91	4.16	33.98
	-1.84	LOSS		-.03	-.16	-3.08	.00	-1.88	-8.25	.00
JUL	115.	GAIN	36.	0.	0.	0.	2.	2.	11.	44.
	0.	LOSS		0.	0.	-1.	0.	-1.	-6.	0.
AUG	108.	GAIN	32.	0.	0.	0.	2.	2.	8.	44.
	-1.	LOSS		0.	0.	0.	0.	-1.	-7.	0.
SEP	65.88	GAIN	27.30	.02	.07	.34	.94	.90	4.21	24.43
	-9.42	LOSS		-.09	-.34	-.13	-.23	-4.08	-22.69	.00
OCT	20.80	GAIN	22.78	.00	.01	.07	.17	.13	.58	4.49
	-25.80	LOSS		-.23	-.76	-.81	-1.13	-8.87	-48.73	.00
NOV	6.37	GAIN	18.08	.00	.00	.00	.01	.00	.00	.91
	-49.09	LOSS		-.33	-1.10	-2.60	-2.26	-12.94	-68.84	.00
DEC	0.	GAIN	17.	0.	0.	0.	0.	0.	0.	0.
	-94.	LOSS		-1.	-2.	-5.	-4.	-20.	-106.	0.
TOT	480.	GAIN	329.	0.	1.	1.	8.	6.	29.	165.
	-464.	LOSS		-3.	-10.	-49.	-18.	-119.	-643.	0.

MAX HEATING LOAD= -367247. BTUH ON DEC 18 HOUR 4 AMBIENT TEMP 1.
MAX COOLING LOAD= 408226. BTUH ON JUL 3 HOUR 12 AMBIENT TEMP 86.

ZONE UA BTU/HR-F 1263.6

BLDG 636 - BRIGADE HQ ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	71.	77.		2	14	58.	2.77	24.70	6.01	27.30
			69.	27	6	4.				
FEB	71.	78.		26	13	59.	2.47	22.04	5.43	24.42
			69.	2	3	15.				
MAR	72.	78.		12	13	74.	2.73	24.35	6.01	26.99
			69.	3	6	15.				
APR	73.	78.		30	12	80.	2.63	23.46	5.82	26.03
			70.	14	5	30.				
MAY	74.	78.		21	11	77.	2.77	24.70	6.01	27.30
			70.	11	4	38.				
JUN	75.	78.		22	13	83.	2.63	23.46	5.82	26.03
			70.	16	4	55.				
JUL	76.	78.		26	13	93.	2.73	24.35	6.01	26.99
			70.	10	5	57.				
AUG	76.	78.		30	12	86.	2.77	24.70	6.01	27.30
			70.	25	5	52.				
SEP	75.	78.		3	11	90.	2.59	23.10	5.82	25.73
			70.	15	6	39.				
OCT	73.	78.		2	13	79.	2.77	24.70	6.01	27.30
			70.	28	5	31.				
NOV	72.	78.		7	14	73.	2.67	23.82	5.82	26.34
			70.	3	4	17.				
DEC	71.	77.		12	14	61.	2.69	23.99	6.01	26.69
			69.	18	4	1.				
YEAR							32.21	287.38	70.81	318.44

BLDG 636 - BRIGADE HQ ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	650	35	0	0	-.3632E+06	.0000
FEB	528	69	0	0	-.2962E+06	.1237E+06
MAR	518	128	0	0	-.2997E+06	.1998E+06
APR	353	243	0	0	-.1901E+06	.2394E+06
MAY	265	334	0	0	-.1349E+06	.3020E+06
JUN	92	375	0	0	-.5169E+05	.3852E+06
JUL	33	479	0	0	-.3881E+05	.4082E+06
AUG	33	468	0	0	-.6114E+05	.3880E+06
SEP	157	339	0	0	-.1212E+06	.4021E+06
OCT	349	239	0	0	-.1762E+06	.3047E+06
NOV	478	118	0	0	-.2440E+06	.2208E+06
DEC	646	26	0	0	-.3672E+06	.9781E+05
YEAR	4102	2853	0	0	-.3672E+06	.4082E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	176.96	.00	2.77	24.70	1.76	27.30	10.8
FEB	141.54	.01	2.47	22.04	1.59	24.42	23.6
MAR	128.85	.48	2.73	24.35	1.76	26.99	29.3
APR	76.69	2.11	2.63	23.46	1.71	26.03	31.9
MAY	51.36	4.42	2.77	24.70	1.76	27.30	35.7
JUN	17.47	7.78	2.63	23.46	1.71	26.03	40.3
JUL	6.27	9.83	2.73	24.35	1.76	26.99	41.6
AUG	6.27	9.38	2.77	24.70	1.76	27.30	40.5
SEP	30.31	5.76	2.59	23.10	1.71	25.73	41.2
OCT	71.29	1.99	2.77	24.70	1.76	27.30	35.9
NOV	110.13	.64	2.67	23.82	1.71	26.34	30.7
DEC	172.54	.04	2.69	23.99	1.76	26.69	17.9
YEAR	989.68	42.43	32.21	287.38	20.75	318.44	41.6

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 177201. BTU/(SQFT-YEAR)

BLDG 636 - BRIGADE HQ ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.3632E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.1237E+06	-.2962E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1998E+06	-.2997E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.2394E+06	-.1901E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.3020E+06	-.1349E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.3852E+06	-.5169E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.4082E+06	-.3881E+05
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.3880E+06	-.6114E+05
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.4021E+06	-.1212E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.3047E+06	-.1762E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.2208E+06	-.2440E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.9781E+05	-.3672E+06

BUILDING MANAGER INTERVIEW

BUILDING INFORMATION:						
Building No: 636		Building Name: Brigade Headquarters				
Surveyed by: DMS		Date: 11/7/95		Building Use: Logistics		
Building Contact:				Phone No:		
Building Contact:				Phone No:		
OCCUPANCY:						
Number of Employees:	Mon./Fri.:	30	Schedule:	730	To	1900
	Tues./Thurs	30		730	To	1900
	Wed.	30		730	To	1900
	Sat./Sun.				To	
Visitors Per Day:	Mon./Fri.:		Schedule:		To	
	Tues./Thurs.				To	
	Wed.				To	
	Sat./Sun.				To	
Comments:						
LIGHTING SCHEDULE:						
Normal Occupancy:	Mon.-Fri.:		Schedule:	730	To	1900
	Sat./Sun.:				To	
Cleaning Crew/2nd Shift:	Mon.-Fri.:		Schedule:		To	
	Sat./Sun.:				To	
EQUIPMENT SCHEDULE:						
Fan/AHU Schedule:	Mon.-Fri.:		Schedule:	0	To	2400
	Sat./Sun.:			0	To	2400
Chiller Schedule:	Mon.-Fri.:		Schedule:	0	To	2400
	Sat./Sun.:			0	To	2400
Boiler Schedule:	Mon.-Fri.:		Schedule:	0	To	2400
	Sat./Sun.:			0	To	2400
Aux. Equipment Schedule:						
	Mon.-Fri.:		Schedule:	0	To	2400
	Sat./Sun.:			0	To	2400
	Mon.-Fri.:		Schedule:		To	
	Sat./Sun.:				To	
Comments:						

Building No 636 **Building Name:** Brigade Head Quarters

BUILDING ENVELOPE

EXTERIOR WALLS		
Wall Direction (N, E, W, or S)	Wall Construction No.	Comments
N	XW-4	
E	XW-4	
S	XW-4	
W	XW-4	

LIST OF EXT. WALL CONSTRUCTION TYPES	
Wall Construction No.	Description
XW-1	Face Brick & CMU
XW-2	Face Brick, CMU, & Gyp. Board
XW-3	Face Brick, CMU, & Ceramic Tile
XW-4	Face Brick, CMU, & Plaster Coat
XW-5	Insulated Metal Panel

WINDOWS		
Window Direction (N, E, W, or S)	Window Construction No.	Comments
N	W-1	
E	W-1	
S	W-1	
W	W-1	
		GENERAL: Insulated metal panel on top portion of
		windows

LIST OF WINDOW TYPES	
Window Construction No.	Description
W-1	Double Pane Clear
W-2	Double Pane Tinted
W-3	Single Pane with Storm Windows
W-4	Single Pane

ROOF CONSTRUCTION		
Roof Location	Roof Construction No.	Comments
ALL	R-2	

LIST OF ROOF CONSTRUCTION TYPES	
Roof Construction No.	Description
R-1	BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile
R-2	BUR, Rigid Insul., Metal Deck, 6" Concrete, Air Space, 6" Batt Insul., Ceiling Tile
R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Cl.g
R-4	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plaste Clg.
R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceiling Tile
R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaste Clg.

Building No 636 **Building Name:** Brigade Head Quarters

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

INTERIOR EQUIPMENT AND OBJECTS			
Wall Direction (N, E, W, or S)	Item No.	No. of Items	Comments
N	A-4	7	
N	E-3	3	
N	M-2	1	
N	M-6	1	
E	M-5	7	
E	E-2	3	
E	A-5	1	2 LF Wood shelf
E	P-4	1	
E	A-4	30	
S	M-5	2	
S	E-2	4	
S	P-3	2	
S	A-4	10	
W	M-5	10	
W	C-3	1	
W	E-2	4	
W	F-4	1	
W	A-4	33	
			GENERAL: Furnished 35'x20' conference room in basement - 3'-0" high paneling

LIST OF EQUIPMENT AND OBJECTS	
Item No.	Description
	Architectural
A-1	Interior Partitions
A-2	Wall Placards
A-3	Drapery Valances
A-4	Drapery Rods, Venician Blinds
A-5	Shelves
A-6	Closet Door
	Plumbing
P-1	Sinks
P-2	Commodes
P-3	Toilet Stalls
P-4	Slop Sink
	HVAC Mechanical
M-1	Floor Supply/Return Grilles
M-2	Ceiling Supply/Return Grilles
M-3	Finned-Tube Baseboard Radiators
M-4	Thermostats / Space Temp. Sensors
M-5	Fan Coil Unit
M-6	
	Electrical
E-1	Electrical Panels
E-2	Electrical Outlets
E-3	Electrical Light Switches
E-4	Wall Mounted Television
	Lighting
L-1	Wall Mounted Fixtures
L-2	Ceiling Mounted Fixtures
L-3	Exit Signs
	Fire Protection
F-1	Alarm Pull Switches
F-2	Alarm Sound Devices (Speakers, Bells)
F-3	Sprinkler Heads
F-4	Fire Extinguishes
	Communication
C-1	Telephones - Wall Mounted
C-2	Telephones - Booth Mounted
C-3	Telephone Jacks

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: DMS
CHECKED BY: AJN
BLDG: 636
FILE: 636FC1

AIR HANDLING UNIT SURVEY OBSERVATIONS

FC-1	AHU NO.	1ST & 2ND FLOORS	LOCATION (RM)
CH-1	REF. SYS. SERVING AHU	ALL	SERVES AREA

UNIT TYPE:

	SINGLE ZN	X	2-PIPE FC		4-PIPE FC		UNIT HTR		H&V
	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION		VAV
	NUMBER OF ZONES				OTHER				
	COMMENT:								

NAMEPLATE:

HERMAN NELSON					MFG.	MAGING4041-60			MODEL
3.8	SUPPLY FAN HP				MFG.				MODEL
0.0	RET/EXH FAN HP				MFG.				MODEL
13450	CFM-HTG	13450	CFM-CLG	15%	MIN %OA	100%	MAX %OA	70.0%	% HTG AREA SERVED
COMMENT:	TOTAL CFM FOR ALL FAN COILS; TWO-PIPE FAN COIL IN EACH ROOM;								

COILS:

X	NONE		STM		HW		ELEC		MOD VLV	PREHEAT
	NONE		STM	X	HW		ELEC		MOD VLV	HEATING
X	NONE		STM		HW		ELEC		MOD VLV	REHEAT
X	NONE		STM		HW		EVAP MEDIA		MOD VLV	HUMID.
	NONE		DX	X	CW				MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	1	1	1	1	1	1	1	1

CONTROLS:

		PNEUMATIC	X	ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:	X	SINGLE STPT		DUAL SETPNT		SETBACK			
SPACE SETPOINT (°F):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	Y	MIN OA (Y/N)	Y	MAX OA (Y/N)		RA (Y/N)		EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:		YES	N	NO					
COMMENTS:	CONTROLS: LOW, MED, HIGH, ON/OFF								

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
BLDG: **636**
FILE: **636UH1**

AIR HANDLING UNIT SURVEY OBSERVATIONS

UH-1	AHU NO.	**BASEMENT**	LOCATION (RM)
CV-1	REF. SYS. SERVING AHU	**BASEMENT**	SERVES AREA

UNIT TYPE:

	SINGLE ZN	X	2-PIPE FC		4-PIPE FC		UNIT HTR		H&V
	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION		VAV
	NUMBER OF ZONES				OTHER				
	COMMENT:								

NAMEPLATE:

OILS - HORIZONTAL					MFG.				MODEL
0.5	SUPPLY FAN HP				MFG.				MODEL
	RET/EXH FAN HP				MFG.				MODEL
2200	CFM-HTG	**0**	CFM-CLG	**0%**	MIN %OA	**0%**	MAX %OA	**30%**	% HTG AREA SERVED
COMMENT:									

COILS:

	NONE		STM		HW		ELEC		MOD VLV	PREHEAT
	NONE		FUEL OIL	X	HW		ELEC		MOD VLV	HEATING
	NONE		STM		HW		ELEC		MOD VLV	REHEAT
	NONE		STM		HW		EVAP MEDIA		MOD VLV	HUMID.
	NONE		DX		CW				MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	**0**	**0**	**0**	**0**	**0**	**0**	**0**	TIMECLOCK?
PRESENT STOP TIME	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**NO**
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**

CONTROLS:

		PNEUMATIC	X	ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK			
SPACE SETPOINT (°F):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:		MIN OA (Y/N)		MAX OA (Y/N)		RA (Y/N)		EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:		YES		NO					
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
BLDG: **636**
FILE: **636CV1**

BOILER & CONVERTER SURVEY OBSERVATIONS

CV-1	BOILER/CONVERTER NO.	**MECH. RM.**	LOCATION (RM)
C.P.	SOURCE OF HEATING (PLANT)	**ALL**	SERVES AREA

UNIT TYPE:

	STEAM		PSIG		HW		TEMP.		BOILER TYPE:
	NO.2 OIL		NO.6 OIL		N.GAS		ELEC		FUELS:
X	STM/HW		HTHW/HW		HTHW/STM		OTHER		CONVERTER TYPE:
	SPACE HEAT		DHW		OTHER				USE:
COMMENT:							0%		% HTG AREA SERVED
									BB RADIATION ONLY

NAMEPLATE:

NO NAME PLATE	MFG.		MODEL	**520600**	CAPACITY OUTPUT (BTUH)
				520600	CAPACITY INPUT (BTUH)
	MFG.		MODEL		CAPACITY OUTPUT (BTUH)
					CAPACITY INPUT (BTUH)
5	DTW PUMP 1 - HP	**BELL & GOSSETT**	MFG.	**1-1/2 8C**	MODEL
	HW PUMP 2 - HP		MFG.		MODEL
	HW PUMP 3 - HP		MFG.		MODEL
COMMENT:					

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	**YES, NO PINS**
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	1	1	1	1	1	1	1	1

CONTROLS:

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		PSIG		HW SUPPLY					
RESET CONTROL (oF):		HW HIGH		HW LOW		OA LOW		OA HIGH	
BURNER CONTROLS		O2 TRIM (Y/N)		OTHER					
COMMENTS:	**2 BARBER COLMAN ELEC./PNEUMATIC TRANSDUCERS,**								
	HAS O.A. TEMPERATURE RESET								

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE: **636CH1**

BLDG: **636**

REFRIGERATION EQUIPMENT SURVEY OBSERVATIONS

CH-1	CHILLER/COMPRESSOR NO.	OUTSIDE BLDG	LOCATION (RM)

UNIT TYPE:

	CENTRIFUGAL WITH WATER SIDE COOLING TOWER						OTHER
	RECIPROCATING WITH WATER SIDE COOLING TOWER					X	AHU'S SERVED FC-1
X	RECIPROCATING WITH AIR COOLED CONDENSING UNIT						
	ABSORBTION WITH WATER SIDE COOLING TOWER						
	AIR COOLED CONDENSING UNIT						
X	CHW		DX		OTHER		

NAMEPLATE:

CHILLER	TSI	MFG.	30AOCS35			MODEL	8-90-A21429				SERIAL NO.
208	VOLTS	112	AMPS	3	PH	60	HZ	30	CAPACITY (TONS)		
CONDENSER FANS		MFG.				MODEL				3	# OF FANS
208	VOLTS	4.6	AMPS	3	PH	60	HZ	1	HP		
DTW PUMP		MFG.	NO NAME PLATE			MODEL					SERIAL NO.
208	VOLTS	5.4	AMPS	3	PH	60	HZ	1.5	HP		
CNW PUMP		MFG.				MODEL					SERIAL NO.
	VOLTS		AMPS		PH		HZ		HP		
COMMENTS:											

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	NO TIMECLOCK
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
0	0	0	0	1	1	1	1	1	0	0	0

CONTROLS:

		PNEUMATIC	X	ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		CWS (oF)		CWR (oF)		CNWS (oF)		CNWR (oF)	
PANEL INDICATORS									
- PRESSURE		LITE-HI		LITE-LOW		GAUGES			
- TEMPERATURE		LITE-HI		LITE-LOW		GAUGES			
- OTHER									

COMMENTS: **FM RADIO CONTROL**

ANNUAL ENERGY SAVINGS SUMMARY
FOR CHAPEL's - BUILDINGS 637, 742, & 843

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Baseline Annual Electric (MBtu)	ECO 1 - Annual Electric (MBtu)	Annual Electric Energy Savings (MBtu)	Baseline Peak Electric Demand (kW)	ECO 1 - Peak Electric Demand (kW)	Peak Electric Demand Savings (kW)	Baseline Nat. Gas Energy Savings (MBtu)	ECO 1 - Annual Nat. Gas (MBtu)	Annual Nat. Gas Energy Savings (MBtu)
637	171.30	135.33	35.97	42.00	39.30	2.70	1246.79	1017.34	229.45

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 637 (SF)	Square Foot Adjust-ment Factor	Annual Electric Energy Savings (MBtu)	Adjusted Annual Electric Energy Savings* (MBtu)	Peak Electric Demand Savings (kW)	Adjusted Peak Electric Demand Savings* (kW)	Annual Nat. Gas Energy Savings (MBtu)	Adjusted Annual Nat. Gas Energy Savings* (MBtu)
742	8,949	8,949	1.000	35.97	35.97	2.70	2.70	229.45	229.45
843	8,890	8,949	0.993	35.97	35.74	2.70	2.68	229.45	227.94

*Energy savings prorated on a square foot basis

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Baseline Annual Electric (MBtu)	ECO 2 - Annual Electric (MBtu)	Annual Electric Energy Savings (MBtu)	Baseline Peak Electric Demand (kW)	ECO 2 - Peak Electric Demand (kW)	Peak Electric Demand Savings (kW)	Baseline Annual Nat. Gas (MBtu)	ECO 2 - Annual Nat. Gas (MBtu)	Annual Nat. Gas Energy Savings (MBtu)
637	171.30	134.06	37.24	42.00	39.20	2.80	1246.79	1014.03	232.76

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 637 (SF)	Square Foot Adjust-ment Factor	Annual Electric Energy Savings (MBtu)	Adjusted Annual Electric Energy Savings* (MBtu)	Peak Electric Demand Savings (kW)	Adjusted Peak Electric Demand Savings* (kW)	Annual Nat. Gas Energy Savings (MBtu)	Adjusted Annual Nat. Gas Energy Savings* (MBtu)
742	8,949	8,949	1.000	37.24	37.24	2.80	2.80	232.76	232.76
843	8,890	8,949	0.993	37.24	36.99	2.80	2.78	232.76	231.23

*Energy savings prorated on a square foot basis

INVESTMENT COST SUMMARY
FOR CHAPEL's - BUILDINGS 637, 742, & 843

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Investment Cost ($)
637	$59,688

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 637 (SF)	Square Foot Adjust-ment Factor	Investment Cost ($)	Adjusted Investment Cost ($)*
742	8,949	8,949	1.000	$59,688	$59,688
843	8,890	8,949	0.993	$59,688	$59,295

*Investment Cost prorated on a square foot basis

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Investment Cost ($)
637	$63,708

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 637 (SF)	Square Foot Adjust-ment Factor	Investment Cost ($)	Adjusted Investment Cost ($)*
742	8,949	8,949	1.000	$63,708	$63,708
843	8,890	8,949	0.993	$63,708	$63,288

*Investment Cost prorated on a square foot basis

LIFE CYCLE COST ANALYSIS SUMMARY

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Leonard Wood	REGION: 2 (Missouri)		PROJECT NO:	1406-011
PROJECT TITLE:	Limited Energy Study, Insulate Brick Buildings			FISCAL YEAR:	1996
ANALYSIS DATE:	02/18/96	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz

1. INVESTMENT: **BLDG 637 - INSTALL 3.5" FIBERGLASS BATT INSULATION ON WALLS**

A.	CONSTRUCTION COST	=	$52,821	
B.	SIOH COST	(7.0% of 1A) =	$3,698	
C.	DESIGN COST	(6.0% of 1A) =	$3,169	
D.	TOTAL COST	(1A +1B +1C) =	$59,688	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT	=	$0	
F.	PUBLIC UTILITY COMPANY REBATE	=	$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$59,688

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96

	ENERGY SOURCE	FUEL COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$7.33	35.97	$263	13.80	$3,636	
B.	DIST	$0.00	0	$0	0.00	$0	
C.	NAT GAS	$5.30	229.45	$1,216	17.76	$21,598	
D.	COAL	$0.00	0	$0	0.00	$0	
E.	ELEC. DEMAND			$200	13.47	$2,699	
F.	TOTAL		265.42	$1,680		-------->	$27,933

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1	ANNUAL MAINTENANCE	$0	$0
2		$0	$0
3		$0	$0
4	TOTAL ANNUAL DISC. SAVINGS (+) / COST	$0	$0

B. NON-RECURRING (+/-)

ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)
a. BASELINE EQUIP. REPLCMNT.				$0
b.				$0
c.				$0
d.				$0
e.				$0
f. TOTAL	$0			$0

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = $0

4.	FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-)	(2F3 + 3A4 + (3Bf1/Economic Life))	$1,680
5.	SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY)	(1G/4) =	35.53
6.	TOTAL NET DISCOUNTED SAVINGS	(2F5 + 3C) =	$27,933
7.	DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (MUST HAVE SIR > 1.25 TO QUALIFY)	(6/1G) =	0.47

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	SHEET 1 OF 1	
ENGINEER	E M C Engineers, Inc.	DATE PREPARED	18-Feb-96
	Denver, CO	ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST Quantity	Unit Cost	Total	LABOR COST Crew/ Worker	Hours/ Unit	Total	TOTAL
1		**BUILDING 637**								
2		**INSTALL 3.5" BATT INSULATION ON WALLS**								
3										
4										
5	I3-1/2I	INSTALL 3-1/2" BATT INSULATION	S.F.	8300.0	$0.18	$1,504	1-CARP	0.007	$1,526	$3,031
6	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	7928.0	$0.20	$1,588	2-CARP	0.017	$7,082	$8,670
7	ISW	INSTALL 2"x4" STUDDED WALL 2' OC	L.F.	4311.0	$0.24	$1,016	F-2	0.009	$2,138	$3,154
8	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	8300.0	$0.07	$554	1-PORD	0.01	$2,003	$2,558
9	RFCU	RELOCATE FAN COIL UNIT	EA.	16.0	$20.30	$325	Q-6	5.67	$7,935	$8,260
10	RBS	RELOCATE BATHROOM SINK	EA.	1.0	$17.58	$18	Q-1	7.35	$414	$432
11	RDR	RELOCATE DRAPERIES, WINDOW SHADES	EA.	24.0	$0.00	$0	L-2	0.744	$829	$829
12	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	2.0	$8.82	$18	1-ELEC	0.844	$51	$69
13	REO	RELOCATE ELECTRICAL OUTLET	EA.	4.0	$7.97	$32	1-ELEC	0.896	$109	$141
14	RFSAG	RELOCATE FLOOR SUPPLY AIR GRILLES	EA.	12.0	$3.82	$46	1-SHEE	1.69	$609	$654
15	RS	RELOCATE SPEAKER	EA.	4.0	$0.00	$0	1-ELEC	1.5	$183	$183
16	RWC	RELOCATE WALL CABINET	EA.	1.0	$0.00	$0	1-CARP	1.7	$45	$45
17	RWPL	RELOCATE WALL PLACARD	EA.	12.0	$0.00	$0	1-CARP	0.654	$206	$206
18	RWTC	RELOCATE WATER CLOSET	EA.	2.0	$35.83	$72	Q-2	10.904	$1,911	$1,983
19	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	138.0	$0.84	$116	2-CARP	0.02	$145	$261
20	IWB-5/8	INSTALL 5/8" WATERPRF BRD - TAPED & SANDE	S.F.	96.0	$0.96	$92	2-CARP	0.02	$101	$193
21	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	372.0	$1.83	$681	2-TILE	0.084	$1,513	$2,195
22										
23										
24										
25										
26										
27		**SUBTOTAL**				$6,061			$26,801	$32,862
28	DIFF	DIFFICULTLY FACTOR			5%				$1,340	$1,340
29		**SUBTOTAL**				$6,061			$28,141	$34,202
30	OH	OVERHEAD			17%	$1,030			$4,784	$5,814
31		**SUBTOTAL**				$7,092			$32,925	$40,016
32	PRO	PROFIT			10%	$709			$3,292	$4,002
33		**SUBTOTAL**				$7,801			$36,217	$44,018
34	CONT	CONTINGENCY			20%	$1,560			$7,243	$8,804
35	**TOTAL COST**					$9,361			$43,461	$52,821

LIFE CYCLE COST ANALYSIS SUMMARY

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Leonard Wood	REGION: 2 (Missouri)		PROJECT NO:	1406-011
PROJECT TITLE:	Limited Energy Study, Insulate Brick Buildings			FISCAL YEAR:	1996
ANALYSIS DATE:	02/20/96	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz

1. INVESTMENT: **BLDG 637 - INSTALL 1.5" RIGID INSULATION ON WALLS**

A.	CONSTRUCTION COST	=	$56,379	
B.	SIOH COST	(7.0% of 1A) =	$3,947	
C.	DESIGN COST	(6.0% of 1A) =	$3,383	
D.	TOTAL COST	(1A +1B +1C) =	$63,708	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT	=	$0	
F.	PUBLIC UTILITY COMPANY REBATE	=	$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$63,708

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96

	ENERGY SOURCE	FUEL COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$7.33	37.24	$273	13.80	$3,764	
B.	DIST	$0.00	0	$0	0.00	$0	
C.	NAT GAS	$5.30	232.76	$1,234	17.76	$21,909	
D.	COAL	$0.00	0	$0	0.00	$0	
E.	ELEC. DEMAND			$208	13.47	$2,799	
F.	TOTAL		270.00	$1,714		-------->	$28,473

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1	ANNUAL MAINTENANCE	$0	14.88	$0
2		$0	14.88	$0
3		$0	14.88	$0
4	TOTAL ANNUAL DISC. SAVINGS (+) / COST	$0		$0

B. NON-RECURRING (+/-)

ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)
a. BASELINE EQUIP. REPLCMNT.	$0	5		$0
b.				$0
c.				$0
d.				$0
e.				$0
f. TOTAL	$0			$0

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = $0

4.	FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-)	(2F3 + 3A4 + (3Bf1/Economic Life))	$1,714
5.	SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY)	(1G/4) =	37.16
6.	TOTAL NET DISCOUNTED SAVINGS	(2F5 + 3C) =	$28,473
7.	DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (MUST HAVE SIR > 1.25 TO QUALIFY)	(6/1G) =	0.45

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	SHEET 1	OF 1
ENGINEER	E M C Engineers, Inc.	DATE PREPARED	18-Feb-96
	Denver, CO	ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST Quantity	Unit Cost	Total	LABOR COST Crew/ Worker	Hours/ Unit	Total	TOTAL
1		**BUILDING 637**								
2		**INSTALL 1.5" RIGID INSULATION ON WALLS**								
3										
4										
5	I1-1/2RI	INSTALL 1-1/2" RIGID INSULATION	S.F.	8300.0	$0.59	$4,909	1-CARP	0.008	$1,745	$6,654
6	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	7928.0	$0.20	$1,588	2-CARP	0.017	$7,082	$8,670
7	IFS	INSTALL 3/4"x2" FURRING STRIPS	L.F.	3054.0	$0.19	$583	1-CARP	0.016	$1,284	$1,866
8	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	8300.0	$0.07	$554	1-PORD	0.01	$2,003	$2,558
9	RFCU	RELOCATE FAN COIL UNIT	EA.	16.0	$20.30	$325	Q-6	5.67	$7,935	$8,260
10	RBS	RELOCATE BATHROOM SINK	EA.	1.0	$17.58	$18	Q-1	7.35	$414	$432
11	RDR	RELOCATE DRAPERIES, WINDOW SHADES	EA.	24.0	$0.00	$0	L-2	0.744	$829	$829
12	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	2.0	$8.82	$18	1-ELEC	0.844	$51	$69
13	REO	RELOCATE ELECTRICAL OUTLET	EA.	4.0	$7.97	$32	1-ELEC	0.896	$109	$141
14	RFSAG	RELOCATE FLOOR SUPPLY AIR GRILLES	EA.	12.0	$3.82	$46	1-SHEE	1.69	$609	$654
15	RS	RELOCATE SPEAKER	EA.	4.0	$0.00	$0	1-ELEC	1.5	$183	$183
16	RWC	RELOCATE WALL CABINET	EA.	1.0	$0.00	$0	1-CARP	1.7	$45	$45
17	RWPL	RELOCATE WALL PLACARD	EA.	12.0	$0.00	$0	1-CARP	0.654	$206	$206
18	RWTC	RELOCATE WATER CLOSET	EA.	2.0	$35.83	$72	Q-2	10.904	$1,911	$1,983
19	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	138.0	$0.84	$116	2-CARP	0.02	$145	$261
20	IWB-5/8	INSTALL 5/8" WATERPRF BRD - TAPED & SANDE	S.F.	96.0	$0.96	$92	2-CARP	0.02	$101	$193
21	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	372.0	$1.83	$681	2-TILE	0.084	$1,513	$2,195
22										
23										
24										
25										
26										
27		**SUBTOTAL**				$9,033			$26,164	$35,197
28	DIFF	DIFFICULTLY FACTOR			5%				$1,308	$1,308
29		**SUBTOTAL**				$9,033			$27,473	$36,506
30	OH	OVERHEAD			17%	$1,536			$4,670	$6,206
31		**SUBTOTAL**				$10,569			$32,143	$42,711
32	PRO	PROFIT			10%	$1,057			$3,214	$4,271
33		**SUBTOTAL**				$11,625			$35,357	$46,983
34	CONT	CONTINGENCY			20%	$2,325			$7,071	$9,397
35	**TOTAL COST**					$13,950			$42,429	$56,379

E M C ENGINEERS, INC.

DATE:	Feb-96
BY:	DMS
JOB:	1406.011
CHK:	AJN
FILE:	637Z1BHL

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT LEONARD WOOD, MO.

BUILDING HEATING LOAD CALCULATION SHEET

BLDG NO: 637 BLDG NAME: CHAPEL - ZONE 1

BLDG FUNCTION: CHAPEL AREA

FLOOR AREA: (SQ. FT) 4,647 # FLOORS 1

SLAB PERIMETER: (FT) 300

I. AREAS: ([ ] FIELD VERIFIED ELEVATION PLANS)

		NORTH	SOUTH	EAST	WEST	TOTAL
WALLS, GROSS	(SQ. FT)	1,822	2,369	1,458	1,458	7,107
GLASS	(SQ. FT)	253	486	94	0	833
PERSONNEL DOOR	(SQ. FT)	21	21	41	0	82
OVERHEAD DOOR	(SQ. FT)	0	0	0	0	0
WALLS, NET	(SQ. FT)	1,548	1,862	1,323	1,458	6,192
ROOF AREA (OR CEILING AREA IF ATTIC IS UNCONDITIONED)					(SQ. FT)	5,313
OVERHEAD DOOR	(SQ. FT)	0	PERSONNEL DOOR		(SQ. FT)	82
BASEMENT WALLS	(SQ. FT)	0	0	0	0	0

II. CONSTRUCTION: ([ ] FIELD VERIFIED WALL, ROOF, WINDOW, DOOR TYPES)

WALLS: (SKETCH CROSS SECTION OF WALL)	COMPONENTS	R-VALUE
	1. OUTSIDE AIR FILM	0.17
	2. 4" FACE BRICK	0.43
	3. AIR SPACE	0.91
	4. 12" CMU	3.03
	5.	
	6.	
	7. INSIDE AIR FILM	0.68
	TOTAL R-WALL =	5.22
	U=1/R	0.191

ROOF: (SKETCH CROSS SECTION OF ROOF)	COMPONENTS	R-VALUE
	1. OUTSIDE AIR FILM	0.17
	2. COMPOSITE SHINGLES	0.44
	3. .375" FELT MEMBRANE	0.29
	4. PLYWOOD SHEATHING	0.47
	5. 1" RIGID INSULATION	4.00
	6. WOOD DECKING	4.76
	7. INSIDE AIR FILM	0.68
	TOTAL R-ROOF =	10.81
	U=1/R	0.093

GLASS TYPE:	PPG 'PENNVERNON' C.L. TWNDV, SSA, .88 S.C.	R-GLASS	1.61
SLAB TYPE FLOOR:	CEMENT	SLF	0.67
BASEMENT TYPE:	NONE	R-BASEM.	0.00
OVERHEAD DOOR TYPE:	NONE	R-ODOOR	0.00
PERSONNEL DOOR TYPE:	2" RED OAK WITH 80% SINGLE GLASS	R-PDOOR	1.06

III. INFILTRATION:

TIGHT WALL H/M/L (SQ.FT.)	H	7107	X CFM / SQ.FT.	0.083	=	590
AVG. WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
LEAKY WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
DOOR OPENINGS / HR - SINGLE DOOR			X CFM /OPENING /HR	1.600	=	0
DOOR OPENINGS / HR - DOUBLE DOORS		10	X CFM /OPENING /HR	1.385	=	14
			TOTAL INFILTRATION (CFM)		=	604

UA ODOOR	ODOOR AREA	0	X DOOR "U"	0.000	=	0
UA PDOOR	PDOOR AREA	82	X DOOR "U"	0.943	=	78
UA WALL	WALL AREA	6,192	X WALL "U"	0.191	=	1,185
UA ROOF	ROOF AREA	5,313	X ROOF "U"	0.093	=	492
UA GLASS	GLASS AREA	833	X GLASS "U"	0.621	=	517
UA SLAB	SLAB PERIM.	300	X SLF	0.670	=	201
UA BASEM.	B-WALL AREA	0	X BASE. "U"	0.000	=	0
INFILTRATION	CFM	604	X A. T. F.	1.035	=	625
			TOTAL UA (BTU/HR°F)			3,098

E M C ENGINEERS, INC.

DATE:	Feb-96
BY:	DMS
JOB:	1406.011
CHK:	AJN
FILE:	637Z2BHL

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT LEONARD WOOD, MO.

BUILDING HEATING LOAD CALCULATION SHEET

BLDG NO: 637 BLDG NAME: CHAPEL - ZONE 2

BLDG FUNCTION: OFFICE AREA

FLOOR AREA: (SQ. FT) 3,189 # FLOORS 1

SLAB PERIMETER: (FT) 219

I. AREAS: ([ ] FIELD VERIFIED ELEVATION PLANS)

		NORTH	SOUTH	EAST	WEST	TOTAL
WALLS, GROSS	(SQ. FT)	358	0	1,002	971	2,331
GLASS	(SQ. FT)	0	0	106	42	148
PERSONNEL DOOR	(SQ. FT)	0	0	74	0	74
INSULATED PANEL	(SQ. FT)	0	0	0	0	0
WALLS, NET	(SQ. FT)	358	0	822	929	2,108
ROOF AREA (OR CEILING AREA IF ATTIC IS UNCONDITIONED)					(SQ. FT)	3,189
INSULATED PANEL	(SQ. FT)	0	PERSONNEL DOOR		(SQ. FT)	74
BASEMENT WALLS	(SQ. FT)	0	0	0	0	0

II. CONSTRUCTION: ([ ] FIELD VERIFIED WALL, ROOF, WINDOW, DOOR TYPES)

WALLS: (SKETCH CROSS SECTION OF WALL)	COMPONENTS	R-VALUE
	1. OUTSIDE AIR FILM	0.17
	2. 4" FACE BRICK	0.43
	3. AIR SPACE	0.91
	4. 6" CMU	1.89
	5.	
	6.	
	7. INSIDE AIR FILM	0.68
	TOTAL R-WALL =	4.08
	U = 1/R	0.245

ROOF: (SKETCH CROSS SECTION OF ROOF)	COMPONENTS	R-VALUE
	1. OUTSIDE AIR FILM	0.17
	2. SHINGLES/FELT/DECK	0.96
	3. CEILING AIR SPACE	1.00
	4. 3" CELLULOSE INSUL	10.00
	5. 3" FB BATT INSUL	11.00
	6. .5" GYPSUM BOARD	0.45
	7. INSIDE AIR FILM	0.68
	TOTAL R-ROOF =	24.26
	U = 1/R	0.041

GLASS TYPE:	PPG 'PENNVERNON' C.L. TWNDV, SSA, .88 S.C.	R-GLASS	1.61
SLAB TYPE FLOOR:	CEMENT	SLF	0.83
BASEMENT TYPE:	NONE	R-BASEM.	0.00
INSULATED PANEL:		R-PANEL	4.20
PERSONNEL DOOR TYPE:	METAL	R-PDOOR	2.56

III. INFILTRATION:

TIGHT WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
AVG. WALL H/M/L (SQ.FT.)	L	2258	X CFM / SQ.FT.	0.092	=	208
LEAKY WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
DOOR OPENINGS / HR - SINGLE DOOR			X CFM /OPENING /HR	1.600	=	0
DOOR OPENINGS / HR - DOUBLE DOORS		5	X CFM /OPENING /HR	1.385	=	7
			TOTAL INFILTRATION (CFM)		=	215

UA PANEL	PANEL AREA	0	X PANEL "U"	0.238	=	0
UA PDOOR	PDOOR AREA	74	X DOOR "U"	0.391	=	29
UA WALL	WALL AREA	2,108	X WALL "U"	0.245	=	516
UA ROOF	ROOF AREA	3,189	X ROOF "U"	0.041	=	131
UA GLASS	GLASS AREA	148	X GLASS "U"	0.621	=	92
UA SLAB	SLAB PERIM.	219	X SLF	0.830	=	182
UA BASEM.	B-WALL AREA	0	X BASE. "U"	0.000	=	0
INFILTRATION	CFM	215	X A. T. F.	1.035	=	222
			TOTAL UA (BTU/HR°F)			1,173

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY DMS
CHECKED BY: AJN
FILE: 637Z1
BLDG: 637 ZONE: 1

Rates of Heat Gain from Occupants of Conditioned Spaces

Zone No.	No. of People	Activity Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)
1	100	1	Seated at rest	Theater, Movie	225	105	22,500	10,500
TOTAL	100					TOTAL	22,500	10,500

Peak Wattage Value for Light

Zone No.	No. of Fixtures	Fixture Type	Description	Watts/Fixture	Total Wattage
1	10		Incandescent - 750w	750	7,500
	4		Incandescent - 200w	200	800
	6	21	Incandescent - 150w	150	900
	7	18	Incandescent - 60w	60	420
TOTAL	27			TOTAL	9,620

Peak Value for Internal Gains

Zone No.	No. of Equipment	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattag	Total (BTU)
1	1	0	Church Organ	1,150	15%	1,150	3,925
				TOTAL	15%	1,150	3,925

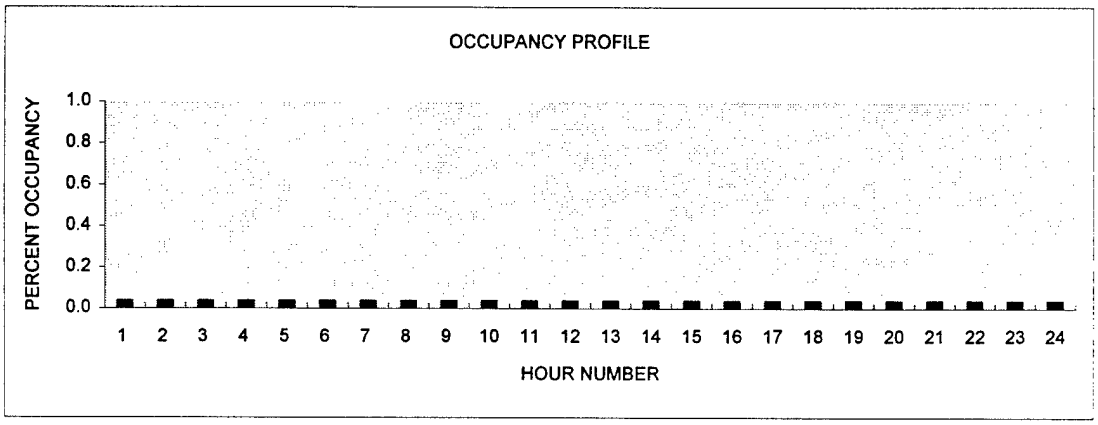
V:\1406.011\COLECTD\FIELD\PLE\637Z1.XLS

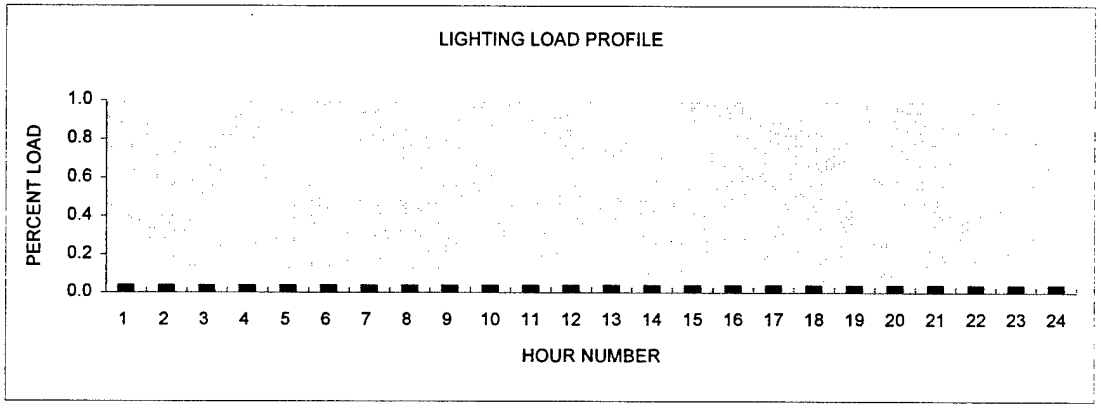
E M C Engineers, Inc.

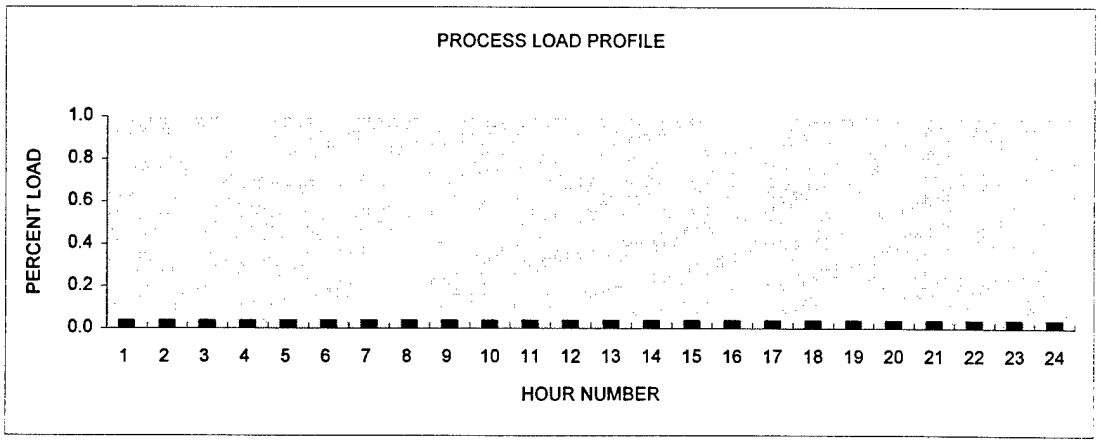
PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 637Z1
BLDG: 637
ZONE: 1

BLDG TYPE	BLDG FUNCTION	TYPE OF PROFILE	HOUR NUMBER																							
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
8	Church	OCCUPANCY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		LIGHTING	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		PROCESS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0







V:\1406.011\COLECTD\FIELD\PLE\637Z1.XLS

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED DMS
CHECKED B AJN
FILE: 637Z2
BLDG: 637 ZONE: 2

Rates of Heat Gain from Occupants of Conditioned Spaces

Zone No.	No. of People	Activity Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)
2	5	2	Seated very light work (writing)	Offices, hotels, a	245	155	1,225	775
TOTAL	5					TOTAL	1,225	775

Peak Wattage Value for Light

Zone No.	No. of Fixtures	Fixture Type	Description	Watts/Fixture	Total Wattage
2	35	6	Fluorescent, 2 - 34w lamps, 16w ballast (2x4	84	2,940
	15	18	Incandescent - 60w	60	900
			0	0	0
			0	0	0
TOTAL	50			TOTAL	3,840

Peak Value for Internal Gains

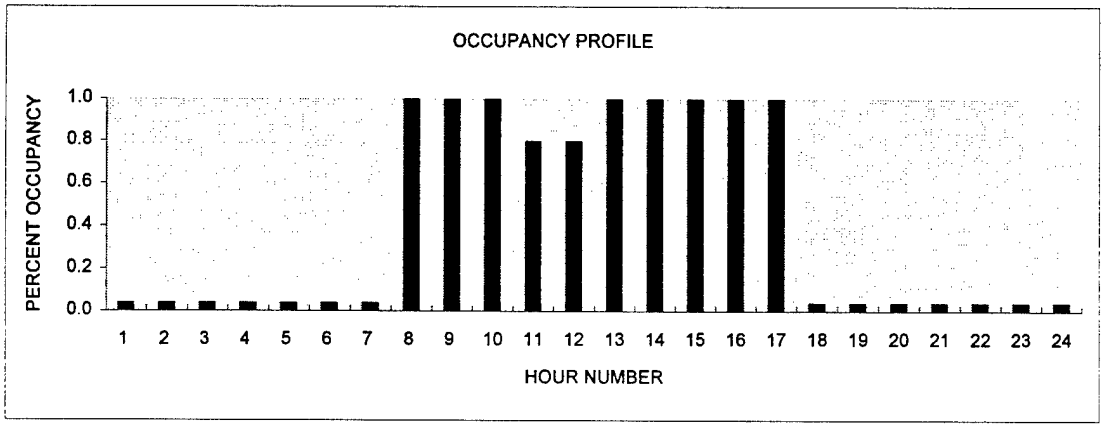
Zone No.	No. of Equipmen	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattage	Total (BTU)
2	1	55	Refrigerator/Freezer	326	15%	326	1,113
	1	62	Television (Color, tube)	300	15%	300	1,024
	1	24	Coffee Maker	1,500	30%	1,500	5,120
	1	46	Microwave Oven	600	65%	600	2,048
	1	51	Range with Oven	10,262	80%	10,262	35,024
	5	5	Printer (laser)	870	34%	4,350	14,847
	5	8	Terminal	145	90%	725	2,474
				TOTAL	63%	18,063	61,649

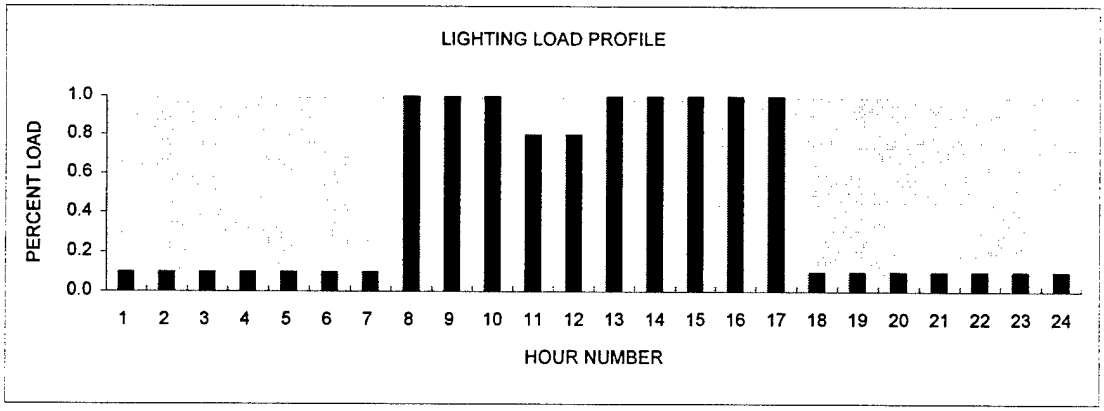
E M C Engineers, Inc.

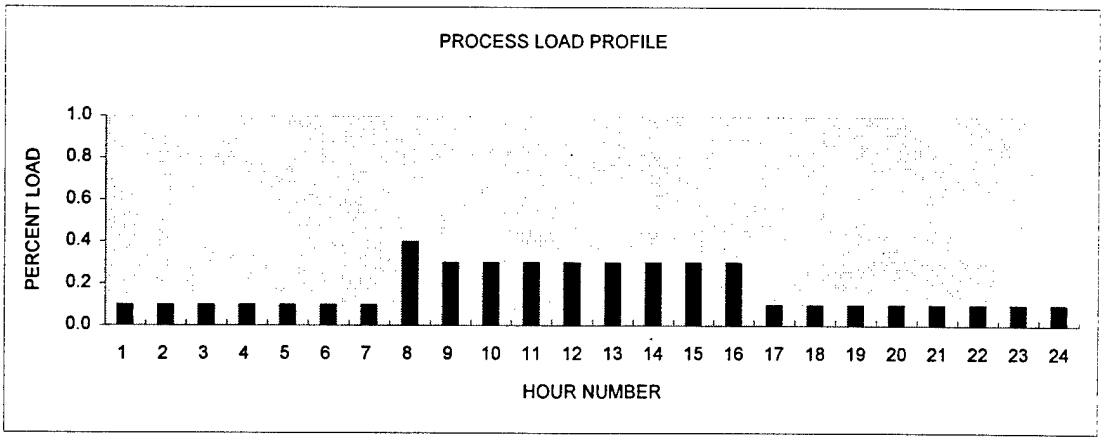
PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 637Z2
BLDG: 637
ZONE: 2

BLDG TYPE	BLDG FUNCTION	TYPE OF PROFILE	HOUR NUMBER																							
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
8	Church	OCCUPANCY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	0.8	0.8	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		LIGHTING	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.0	1.0	1.0	0.8	0.8	1.0	1.0	1.0	1.0	1.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		PROCESS	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1







V:\1406.011\COLECTD\FIELD\PLE\637Z2.XLS

BLDG 637 - CHAPEL SANCTUARY AREA - ZONE 1 BASELINE

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.900000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.000000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 127093.000000
FLOOR AREA (SQFT) 4647.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 475000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -360000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 46470.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 604.000000
INFILTRATION PROFILE

1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

A FACTOR IN INFILTRATION EQUATION (CINA) 2.850000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 4250.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 201.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 78.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 1.000000

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1862.0	1458.0	1548.0	1323.0
WINDOW AREA SQFT (AWND)	486.0	.0	253.0	94.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	48.6	.0	25.3	9.4
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.191	.191	.191	.191
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00155	.00155	.00155	.00155
NUMBER OF BN FACTORS (NB	6	6	6	6
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00000	.00000	.00000	.00000
N=3	.00015	.00015	.00015	.00015
N=4	.00064	.00064	.00064	.00064
N=5	.00060	.00060	.00060	.00060
N=6	.00015	.00015	.00015	.00015
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-2.48050	-2.48050	-2.48050	-2.48050
N=3	2.22216	2.22216	2.22216	2.22216
N=4	-.87313	-.87313	-.87313	-.87313
N=5	.14299	.14299	.14299	.14299
N=6	-.00853	-.00853	-.00853	-.00853

ROOF AREA SQFT (AROF) 5313.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 9.300000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 2.105661E-03
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .000 .439E-03 .105E-02 .526E-03 .877E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.98 1.34 -.374 .434E-01 -.170E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 1.500000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	10.	589.	22500.	10500.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.040	.040	.040	.040	70.0	75.0
2	.040	.040	.040	.040	70.0	75.0
3	.040	.040	.040	.040	70.0	75.0
4	.040	.040	.040	.040	70.0	75.0
5	.040	.040	.040	.040	70.0	75.0
6	.040	.040	.040	.040	70.0	75.0
7	.040	.040	.040	.040	70.0	75.0
8	.040	.040	.040	.040	70.0	75.0

```
  9         .040      .040      .040      .040        70.0        75.0
 10         .040      .040      .040      .040        70.0        75.0
 11         .040      .040      .040      .040        70.0        75.0
 12         .040      .040      .040      .040        70.0        75.0
 13         .040      .040      .040      .040        70.0        75.0
 14         .040      .040      .040      .040        70.0        75.0
 15         .040      .040      .040      .040        70.0        75.0
 16         .040      .040      .040      .040        70.0        75.0
 17         .040      .040      .040      .040        70.0        75.0
 18         .040      .040      .040      .040        70.0        75.0
 19         .040      .040      .040      .040        70.0        75.0
 20         .040      .040      .040      .040        70.0        75.0
 21         .040      .040      .040      .040        70.0        75.0
 22         .040      .040      .040      .040        70.0        75.0
 23         .040      .040      .040      .040        70.0        75.0
 24         .040      .040      .040      .040        70.0        75.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)     6970.000000
ECONOMIZER HIGH TEMP LIMIT F        65.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)          1.000000
HEATING PLANT RATED OUTPUT BTU (HFLOT)   475000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)    593750.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)             4
COOLING PLANT RATED OUTPUT BTU (CFLOT)    360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)     92151.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 637 - CHAPEL SANCTUARY AREA - ZONE 1 BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	16.	0.	0.	0.	0.	0.	0.	0.
	-170.	LOSS		-14.	-7.	0.	-63.	-11.	-96.	0.
FEB	0.	GAIN	19.	0.	0.	0.	0.	0.	0.	0.
	-136.	LOSS		-12.	-6.	0.	-51.	-10.	-81.	0.
MAR	1.	GAIN	24.	0.	0.	0.	0.	0.	0.	0.
	-104.	LOSS		-10.	-6.	0.	-35.	-9.	-72.	0.
APR	10.31	GAIN	22.32	.06	.05	.00	2.95	.08	.53	1.89
	-44.23	LOSS		-5.69	-3.23	.00	-13.91	-5.09	-38.74	.00
MAY	31.67	GAIN	23.30	.34	.15	.00	12.89	.23	1.34	8.27
	-8.12	LOSS		-2.63	-1.83	.00	-.91	-2.79	-19.88	.00
JUN	84.39	GAIN	23.30	.98	.40	.00	25.61	.63	3.85	36.52
	-.16	LOSS		-.90	-.88	.00	.00	-1.33	-8.82	.00
JUL	118.	GAIN	23.	2.	1.	0.	37.	2.	10.	46.
	0.	LOSS		0.	-1.	0.	0.	-1.	-6.	0.
AUG	107.	GAIN	21.	2.	1.	0.	31.	1.	7.	46.
	0.	LOSS		0.	-1.	0.	0.	-1.	-6.	0.
SEP	61.27	GAIN	20.16	.55	.37	.00	16.16	.60	3.96	27.58
	-10.23	LOSS		-2.35	-1.43	.00	-1.17	-2.21	-16.03	.00
OCT	11.03	GAIN	18.45	.02	.06	.00	2.17	.09	.58	3.72
	-41.86	LOSS		-6.12	-3.05	.00	-13.98	-4.68	-33.20	.00
NOV	1.57	GAIN	16.39	.00	.01	.00	.00	.01	.09	.44
	-87.46	LOSS		-9.20	-4.58	.00	-33.76	-7.05	-53.17	.00
DEC	0.	GAIN	15.	0.	0.	0.	0.	0.	0.	0.
	-170.	LOSS		-14.	-7.	0.	-67.	-11.	-92.	0.
TOT	427.	GAIN	243.	6.	3.	0.	128.	4.	27.	171.
	-773.	LOSS		-78.	-42.	0.	-278.	-66.	-523.	0.

MAX HEATING LOAD= -475000. BTUH ON DEC 18 HOUR 7 AMBIENT TEMP -1.
MAX COOLING LOAD= 350225. BTUH ON SEP 2 HOUR 12 AMBIENT TEMP 91.

ZONE UA BTU/HR-F 2271.1

BLDG 637 - CHAPEL SANCTUARY AREA - ZONE 1 BASELINE

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	69.	75.		1	13	53.	.23	.09	3.78	5.09
			67.	29	7	14.				
FEB	69.	77.		17	13	59.	.20	.08	3.41	4.57
			67.	6	7	14.				
MAR	70.	78.		12	13	74.	.22	.09	3.78	5.05
			57.	24	19	69.				
APR	72.	78.		25	12	77.	.21	.09	3.66	4.87
			59.	2	19	69.				
MAY	74.	78.		31	12	80.	.23	.09	3.78	5.09
			69.	11	5	39.				
JUN	76.	79.		29	12	87.	.21	.09	3.66	4.87
			70.	17	5	56.				
JUL	76.	79.		5	12	85.	.22	.09	3.78	5.05
			72.	24	5	65.				
AUG	76.	78.		30	12	86.	.23	.09	3.78	5.09
			70.	26	5	57.				
SEP	74.	81.		25	12	63.	.20	.08	3.66	4.83
			69.	16	6	43.				
OCT	71.	78.		4	12	83.	.23	.09	3.78	5.09
			66.	14	20	69.				
NOV	70.	77.		8	13	77.	.22	.09	3.66	4.92
			57.	7	18	69.				
DEC	69.	76.		23	13	71.	.21	.09	3.78	5.01
			67.	18	7	-1.				
YEAR							2.59	1.06	44.48	59.55

BLDG 637 - CHAPEL SANCTUARY AREA - ZONE 1 BASELINE

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	740	0	0	0	-.4571E+06	.0000
FEB	663	1	0	0	-.3941E+06	.0000
MAR	678	43	0	0	-.3783E+06	.1213E+06
APR	492	159	0	0	-.2244E+06	.1604E+06
MAY	219	400	0	0	-.1248E+06	.2216E+06
JUN	21	642	0	0	-.1730E+05	.3155E+06
JUL	0	717	0	0	.0000	.3303E+06
AUG	13	704	0	0	-.2748E+05	.3082E+06
SEP	206	456	0	0	-.1179E+06	.3502E+06
OCT	523	152	0	0	-.2042E+06	.2353E+06
NOV	655	36	0	0	-.3134E+06	.1335E+06
DEC	741	0	1	0	-.4750E+06	.0000
YEAR	4951	3310	1	0	-.4750E+06	.3502E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	232.17	.00	.23	.09	1.11	5.09	1.9
FEB	190.23	.00	.20	.08	1.00	4.57	1.9
MAR	157.43	.14	.22	.09	1.11	5.05	12.0
APR	82.87	.96	.21	.09	1.07	4.87	14.4
MAY	27.11	2.78	.23	.09	1.11	5.09	19.5
JUN	2.38	7.03	.21	.09	1.07	4.87	26.9
JUL	.00	9.58	.22	.09	1.11	5.05	27.6
AUG	1.47	8.78	.23	.09	1.11	5.09	26.1
SEP	26.42	5.11	.20	.08	1.07	4.83	28.3
OCT	82.79	1.01	.23	.09	1.11	5.09	20.6
NOV	137.99	.16	.22	.09	1.07	4.92	12.8
DEC	231.78	.00	.21	.09	1.11	5.01	1.9
YEAR	1172.64	35.55	2.59	1.06	13.03	59.55	28.3

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 290159. BTU/(SQFT-YEAR)

BLDG 637 - CHAPEL SANCTUARY AREA - ZONE 1 BASELINE

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1074.	696.	1.000	35.	0.	0.	0	0	.0000	-.4571E+06
FEB	1494.	948.	1.000	37.	0.	0.	0	0	.0000	-.3941E+06
MAR	1944.	1269.	1.000	43.	0.	0.	0	0	.1213E+06	-.3783E+06
APR	2323.	1608.	1.000	55.	0.	0.	0	0	.1604E+06	-.2244E+06
MAY	2570.	1829.	1.000	65.	0.	0.	0	0	.2216E+06	-.1248E+06
JUN	2646.	1993.	1.000	72.	0.	0.	0	0	.3155E+06	-.1730E+05
JUL	2549.	2018.	1.000	77.	0.	0.	0	0	.3303E+06	.0000
AUG	2291.	1849.	1.000	76.	0.	0.	0	0	.3082E+06	-.2748E+05
SEP	1878.	1388.	1.000	68.	0.	0.	0	0	.3502E+06	-.1179E+06
OCT	1467.	972.	1.000	57.	0.	0.	0	0	.2353E+06	-.2042E+06
NOV	1071.	754.	1.000	47.	0.	0.	0	0	.1335E+06	-.3134E+06
DEC	916.	627.	1.000	35.	0.	0.	0	1	.0000	-.4750E+06

BLDG 637 - CHAPEL SANCT. AREA - ZONE 1 ECO-1 INSTALL FIBERGLASS INSUL.

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.900000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA --------------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.000000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 127093.000000
FLOOR AREA (SQFT) 4647.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 475000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -360000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 46470.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 604.000000
INFILTRATION PROFILE

1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

A FACTOR IN INFILTRATION EQUATION (CINA) 2.850000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 4250.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 201.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 78.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 1.000000

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1862.0	1458.0	1548.0	1323.0
WINDOW AREA SQFT (AWND)	486.0	.0	253.0	94.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	48.6	.0	25.3	9.4
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.060	.060	.060	.060
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00165	.00165	.00165	.00165
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00015	.00015	.00015	.00015
N=3	.00081	.00081	.00081	.00081
N=4	.00062	.00062	.00062	.00062
N=5	.00008	.00008	.00008	.00008
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	-.16643	-.16643	-.16643	-.16643
N=5	.00728	.00728	.00728	.00728
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 5313.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 9.300000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 2.105661E-03
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .000 .439E-03 .105E-02 .526E-03 .877E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.98 1.34 -.374 .434E-01 -.170E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 1.500000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	10.	589.	22500.	10500.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.040	.040	.040	.040	70.0	75.0
2	.040	.040	.040	.040	70.0	75.0
3	.040	.040	.040	.040	70.0	75.0
4	.040	.040	.040	.040	70.0	75.0
5	.040	.040	.040	.040	70.0	75.0
6	.040	.040	.040	.040	70.0	75.0
7	.040	.040	.040	.040	70.0	75.0
8	.040	.040	.040	.040	70.0	75.0

```
  9         .040      .040      .040      .040        70.0        75.0
 10         .040      .040      .040      .040        70.0        75.0
 11         .040      .040      .040      .040        70.0        75.0
 12         .040      .040      .040      .040        70.0        75.0
 13         .040      .040      .040      .040        70.0        75.0
 14         .040      .040      .040      .040        70.0        75.0
 15         .040      .040      .040      .040        70.0        75.0
 16         .040      .040      .040      .040        70.0        75.0
 17         .040      .040      .040      .040        70.0        75.0
 18         .040      .040      .040      .040        70.0        75.0
 19         .040      .040      .040      .040        70.0        75.0
 20         .040      .040      .040      .040        70.0        75.0
 21         .040      .040      .040      .040        70.0        75.0
 22         .040      .040      .040      .040        70.0        75.0
 23         .040      .040      .040      .040        70.0        75.0
 24         .040      .040      .040      .040        70.0        75.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)     6970.000000
ECONOMIZER HIGH TEMP LIMIT F        65.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)          1.000000
HEATING PLANT RATED OUTPUT BTU (HFLOT)   475000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)    593750.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)             4
COOLING PLANT RATED OUTPUT BTU (CFLOT)    360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)     92151.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 637 - CHAPEL SANCT. AREA - ZONE 1 ECO-1 INSTALL FIBERGLASS INSUL.

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	16.	0.	0.	0.	0.	0.	0.	0.
	-116.	LOSS		-14.	-7.	0.	-8.	-12.	-97.	0.
FEB	.02	GAIN	18.64	.00	.00	.00	.00	.00	.00	.02
	-92.85	LOSS		-11.85	-6.22	.00	-5.73	-9.80	-82.45	.00
MAR	2.24	GAIN	23.60	.00	.00	.00	.10	.00	.01	.25
	-77.02	LOSS		-10.44	-5.75	.00	-4.25	-9.04	-74.33	.00
APR	10.57	GAIN	22.32	.06	.04	.00	.74	.07	.47	1.73
	-35.74	LOSS		-5.74	-3.25	.00	-1.74	-5.12	-39.62	.00
MAY	25.97	GAIN	23.30	.41	.15	.00	1.94	.23	1.34	7.02
	-11.21	LOSS		-2.43	-1.68	.00	-.27	-2.56	-17.77	.00
JUN	59.43	GAIN	23.30	1.11	.41	.00	3.37	.63	3.87	28.51
	-1.62	LOSS		-.63	-.66	.00	.00	-.99	-5.98	.00
JUL	83.30	GAIN	23.30	2.31	.96	.00	4.47	1.51	9.68	40.50
	-.64	LOSS		-.33	-.41	.00	.00	-.62	-3.78	.00
AUG	74.18	GAIN	21.46	1.63	.74	.00	3.80	1.14	6.95	38.18
	-1.04	LOSS		-.35	-.47	.00	.00	-.71	-4.34	.00
SEP	43.73	GAIN	20.16	.59	.37	.00	2.07	.60	3.98	20.86
	-11.41	LOSS		-2.24	-1.35	.00	-.36	-2.09	-15.12	.00
OCT	10.70	GAIN	18.45	.02	.06	.00	.44	.09	.57	2.91
	-33.03	LOSS		-6.15	-3.06	.00	-1.94	-4.71	-34.11	.00
NOV	2.92	GAIN	16.39	.00	.00	.00	.05	.00	.01	.51
	-60.89	LOSS		-9.33	-4.64	.00	-4.15	-7.15	-54.59	.00
DEC	0.	GAIN	15.	0.	0.	0.	0.	0.	0.	0.
	-112.	LOSS		-14.	-7.	0.	-8.	-11.	-92.	0.
TOT	313.	GAIN	243.	6.	3.	0.	17.	4.	27.	140.
	-554.	LOSS		-78.	-42.	0.	-34.	-66.	-521.	0.

MAX HEATING LOAD= -387684. BTUH ON DEC 18 HOUR 2 AMBIENT TEMP 3.
MAX COOLING LOAD= 312648. BTUH ON SEP 2 HOUR 12 AMBIENT TEMP 91.

ZONE UA BTU/HR-F 1460.0

BEACON Energy Analysis By EMC Engineers, Inc. 637AFG.I

BLDG 637 - CHAPEL SANCT. AREA - ZONE 1 ECO-1 INSTALL FIBERGLASS INSUL.

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL INTERNAL HEAT GAIN MILLION BTU
JAN	70.	77.		1	13	53.	.23	.09	3.78	5.09
			69.	27	6	4.				
FEB	70.	78.		26	12	58.	.20	.08	3.41	4.57
			69.	20	6	15.				
MAR	71.	81.		27	12	64.	.22	.09	3.78	5.05
			68.	24	19	69.				
APR	72.	78.		25	12	77.	.21	.09	3.66	4.87
			69.	1	1	33.				
MAY	73.	78.		31	12	80.	.23	.09	3.78	5.09
			69.	11	5	39.				
JUN	74.	78.		29	12	87.	.21	.09	3.66	4.87
			70.	17	5	56.				
JUL	75.	78.		27	12	90.	.22	.09	3.78	5.05
			70.	10	5	57.				
AUG	75.	78.		30	12	86.	.23	.09	3.78	5.09
			70.	25	6	51.				
SEP	74.	78.		9	12	86.	.20	.08	3.66	4.83
			69.	15	6	39.				
OCT	72.	78.		4	12	83.	.23	.09	3.78	5.09
			69.	28	5	31.				
NOV	71.	78.		8	13	77.	.22	.09	3.66	4.92
			69.	3	7	18.				
DEC	70.	77.		16	13	57.	.21	.09	3.78	5.01
			68.	18	7	-1.				
YEAR							2.59	1.06	44.48	59.55

BLDG 637 - CHAPEL SANCT. AREA - ZONE 1 ECO-1 INSTALL FIBERGLASS INSUL.

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	717	8	0	0	-.3771E+06	.0000
FEB	632	24	0	0	-.3103E+06	.2269E+05
MAR	639	76	0	0	-.3174E+06	.1325E+06
APR	484	173	0	0	-.1863E+06	.1550E+06
MAY	329	311	0	0	-.1226E+06	.1985E+06
JUN	119	431	0	0	-.4308E+05	.2736E+06
JUL	61	577	0	0	-.3215E+05	.2849E+06
AUG	63	538	0	0	-.5484E+05	.2697E+06
SEP	236	347	0	0	-.1174E+06	.3126E+06
OCT	510	158	0	0	-.1747E+06	.2259E+06
NOV	616	67	0	0	-.2466E+06	.1592E+06
DEC	710	12	0	0	-.3877E+06	.7088E+05
YEAR	5116	2722	0	0	-.3877E+06	.3126E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	171.74	.00	.23	.09	1.11	5.09	1.9
FEB	142.29	.00	.20	.08	1.00	4.57	5.1
MAR	126.21	.21	.22	.09	1.11	5.05	12.8
APR	73.68	.98	.21	.09	1.07	4.87	14.1
MAY	39.87	2.30	.23	.09	1.11	5.09	17.6
JUN	13.46	4.95	.21	.09	1.07	4.87	23.8
JUL	6.90	6.92	.22	.09	1.11	5.05	24.7
AUG	7.14	6.16	.23	.09	1.11	5.09	23.2
SEP	30.43	3.67	.20	.08	1.07	4.83	26.4
OCT	73.44	.96	.23	.09	1.11	5.09	19.8
NOV	108.62	.28	.22	.09	1.07	4.92	14.6
DEC	168.31	.02	.21	.09	1.11	5.01	8.5
YEAR	962.08	26.47	2.59	1.06	13.03	59.55	26.4

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 238173. BTU/(SQFT-YEAR)

BLDG 637 - CHAPEL SANCT. AREA - ZONE 1 ECO-1 INSTALL FIBERGLASS INSUL.

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1074.	696.	1.000	35.	0.	0.	0	0	.0000	-.3771E+06
FEB	1494.	948.	1.000	37.	0.	0.	0	0	.2269E+05	-.3103E+06
MAR	1944.	1269.	1.000	43.	0.	0.	0	0	.1325E+06	-.3174E+06
APR	2323.	1608.	1.000	55.	0.	0.	0	0	.1550E+06	-.1863E+06
MAY	2570.	1829.	1.000	65.	0.	0.	0	0	.1985E+06	-.1226E+06
JUN	2646.	1993.	1.000	72.	0.	0.	0	0	.2736E+06	-.4308E+05
JUL	2549.	2018.	1.000	77.	0.	0.	0	0	.2849E+06	-.3215E+05
AUG	2291.	1849.	1.000	76.	0.	0.	0	0	.2697E+06	-.5484E+05
SEP	1878.	1388.	1.000	68.	0.	0.	0	0	.3126E+06	-.1174E+06
OCT	1467.	972.	1.000	57.	0.	0.	0	0	.2259E+06	-.1747E+06
NOV	1071.	754.	1.000	47.	0.	0.	0	0	.1592E+06	-.2466E+06
DEC	916.	627.	1.000	35.	0.	0.	0	0	.7088E+05	-.3877E+06

BLDG 637 - CHAPEL SANCT. AREA - ZONE 1 ECO-2 INSTALL RIGID INSULATION

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.900000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.000000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 127093.000000
FLOOR AREA (SQFT) 4647.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 475000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -360000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 46470.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 604.000000
INFILTRATION PROFILE

1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

A FACTOR IN INFILTRATION EQUATION (CINA) 2.850000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 4250.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 201.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 78.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 1.000000

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1862.0	1458.0	1548.0	1323.0
WINDOW AREA SQFT (AWND)	486.0	.0	253.0	94.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	48.6	.0	25.3	9.4
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.052	.052	.052	.052
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00165	.00165	.00165	.00165
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00018	.00018	.00018	.00018
N=3	.00084	.00084	.00084	.00084
N=4	.00056	.00056	.00056	.00056
N=5	.00006	.00006	.00006	.00006
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	-.14508	-.14508	-.14508	-.14508
N=5	.00613	.00613	.00613	.00613
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 5313.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 9.300000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 2.105661E-03
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .000 .439E-03 .105E-02 .526E-03 .877E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.98 1.34 -.374 .434E-01 -.170E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 1.500000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	BTU/HR			THERMOSTAT SET POINT DEG F	
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	10.	589.	22500.	10500.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.040	.040	.040	.040	70.0	75.0
2	.040	.040	.040	.040	70.0	75.0
3	.040	.040	.040	.040	70.0	75.0
4	.040	.040	.040	.040	70.0	75.0
5	.040	.040	.040	.040	70.0	75.0
6	.040	.040	.040	.040	70.0	75.0
7	.040	.040	.040	.040	70.0	75.0
8	.040	.040	.040	.040	70.0	75.0

```
  9         .040      .040      .040      .040        70.0        75.0
 10         .040      .040      .040      .040        70.0        75.0
 11         .040      .040      .040      .040        70.0        75.0
 12         .040      .040      .040      .040        70.0        75.0
 13         .040      .040      .040      .040        70.0        75.0
 14         .040      .040      .040      .040        70.0        75.0
 15         .040      .040      .040      .040        70.0        75.0
 16         .040      .040      .040      .040        70.0        75.0
 17         .040      .040      .040      .040        70.0        75.0
 18         .040      .040      .040      .040        70.0        75.0
 19         .040      .040      .040      .040        70.0        75.0
 20         .040      .040      .040      .040        70.0        75.0
 21         .040      .040      .040      .040        70.0        75.0
 22         .040      .040      .040      .040        70.0        75.0
 23         .040      .040      .040      .040        70.0        75.0
 24         .040      .040      .040      .040        70.0        75.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)     6970.000000
ECONOMIZER HIGH TEMP LIMIT F        65.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)          1.000000
HEATING PLANT RATED OUTPUT BTU (HFLOT)   475000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)    593750.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)             4
COOLING PLANT RATED OUTPUT BTU (CFLOT)    360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)     92151.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 637 - CHAPEL SANCT. AREA - ZONE 1 ECO-2 INSTALL RIGID INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	16.	0.	0.	0.	0.	0.	0.	0.
	-115.	LOSS		-14.	-7.	0.	-7.	-12.	-97.	0.
FEB	.02	GAIN	18.64	.00	.00	.00	.00	.00	.00	.02
	-92.13	LOSS		-11.85	-6.22	.00	-4.96	-9.81	-82.49	.00
MAR	2.25	GAIN	23.60	.00	.00	.00	.10	.00	.01	.25
	-76.55	LOSS		-10.45	-5.75	.00	-3.70	-9.04	-74.38	.00
APR	10.54	GAIN	22.32	.06	.04	.00	.68	.07	.47	1.69
	-35.62	LOSS		-5.74	-3.25	.00	-1.52	-5.12	-39.64	.00
MAY	25.87	GAIN	23.30	.41	.15	.00	1.71	.23	1.34	7.00
	-11.31	LOSS		-2.42	-1.68	.00	-.26	-2.56	-17.75	.00
JUN	58.96	GAIN	23.30	1.11	.41	.00	2.93	.63	3.87	28.29
	-1.69	LOSS		-.62	-.65	.00	.00	-.98	-5.90	.00
JUL	82.34	GAIN	23.30	2.31	.96	.00	3.88	1.51	9.68	40.04
	-.69	LOSS		-.32	-.40	.00	.00	-.61	-3.74	.00
AUG	73.13	GAIN	21.46	1.63	.74	.00	3.30	1.14	6.95	37.52
	-1.08	LOSS		-.34	-.46	.00	.00	-.70	-4.29	.00
SEP	43.23	GAIN	20.16	.59	.37	.00	1.81	.60	3.98	20.51
	-11.44	LOSS		-2.24	-1.34	.00	-.33	-2.08	-15.09	.00
OCT	10.72	GAIN	18.45	.02	.06	.00	.40	.09	.57	2.91
	-32.88	LOSS		-6.15	-3.06	.00	-1.70	-4.70	-34.14	.00
NOV	2.95	GAIN	16.39	.00	.00	.00	.05	.00	.01	.51
	-60.42	LOSS		-9.33	-4.65	.00	-3.61	-7.15	-54.63	.00
DEC	0.	GAIN	15.	0.	0.	0.	0.	0.	0.	0.
	-111.	LOSS		-14.	-7.	0.	-7.	-11.	-92.	0.
TOT	310.	GAIN	243.	6.	3.	0.	15.	4.	27.	139.
	-550.	LOSS		-78.	-42.	0.	-29.	-65.	-521.	0.

MAX HEATING LOAD= -385807. BTUH ON DEC 18 HOUR 2 AMBIENT TEMP 3.
MAX COOLING LOAD= 312032. BTUH ON SEP 2 HOUR 12 AMBIENT TEMP 91.

ZONE UA BTU/HR-F 1410.5

BEACON Energy Analysis By EMC Engineers, Inc. 637ARGD.I

BLDG 637 - CHAPEL SANCT. AREA - ZONE 1 ECO-2 INSTALL RIGID INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	77.		31	13	59.	.23	.09	3.78	5.09
			69.	27	6	4.				
FEB	70.	78.		26	12	58.	.20	.08	3.41	4.57
			69.	20	6	15.				
MAR	71.	81.		27	12	64.	.22	.09	3.78	5.05
			68.	24	19	69.				
APR	72.	78.		25	12	77.	.21	.09	3.66	4.87
			69.	11	5	32.				
MAY	73.	78.		31	12	80.	.23	.09	3.78	5.09
			69.	11	5	39.				
JUN	74.	78.		29	12	87.	.21	.09	3.66	4.87
			70.	17	5	56.				
JUL	75.	78.		27	12	90.	.22	.09	3.78	5.05
			70.	10	5	57.				
AUG	75.	78.		30	12	86.	.23	.09	3.78	5.09
			70.	25	6	51.				
SEP	74.	78.		1	12	87.	.20	.08	3.66	4.83
			69.	15	6	39.				
OCT	72.	78.		4	12	83.	.23	.09	3.78	5.09
			69.	28	5	31.				
NOV	71.	78.		8	13	77.	.22	.09	3.66	4.92
			69.	3	7	18.				
DEC	70.	77.		16	13	57.	.21	.09	3.78	5.01
			68.	18	7	-1.				
YEAR							2.59	1.06	44.48	59.55

BLDG 637 - CHAPEL SANCT. AREA - ZONE 1 ECO-2 INSTALL RIGID INSULATION

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	717	9	0	0	-.3757E+06	.0000
FEB	632	26	0	0	-.3088E+06	.2386E+05
MAR	638	77	0	0	-.3160E+06	.1326E+06
APR	484	171	0	0	-.1859E+06	.1548E+06
MAY	329	309	0	0	-.1225E+06	.1982E+06
JUN	121	427	0	0	-.4357E+05	.2731E+06
JUL	62	570	0	0	-.3275E+05	.2841E+06
AUG	66	529	0	0	-.5529E+05	.2691E+06
SEP	240	342	0	0	-.1171E+06	.3120E+06
OCT	512	159	0	0	-.1740E+06	.2257E+06
NOV	615	67	0	0	-.2452E+06	.1593E+06
DEC	710	12	0	0	-.3858E+06	.7189E+05
YEAR	5126	2698	0	0	-.3858E+06	.3120E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	170.74	.00	.23	.09	1.11	5.09	1.9
FEB	141.58	.00	.20	.08	1.00	4.57	5.2
MAR	125.64	.22	.22	.09	1.11	5.05	12.8
APR	73.66	.98	.21	.09	1.07	4.87	14.1
MAY	39.88	2.29	.23	.09	1.11	5.09	17.6
JUN	13.69	4.91	.21	.09	1.07	4.87	23.8
JUL	7.01	6.84	.22	.09	1.11	5.05	24.7
AUG	7.48	6.07	.23	.09	1.11	5.09	23.2
SEP	30.89	3.63	.20	.08	1.07	4.83	26.4
OCT	73.52	.96	.23	.09	1.11	5.09	19.8
NOV	108.09	.28	.22	.09	1.07	4.92	14.6
DEC	167.32	.02	.21	.09	1.11	5.01	8.6
YEAR	959.50	26.20	2.59	1.06	13.03	59.55	26.4

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 237425. BTU/(SQFT-YEAR)

BLDG 637 - CHAPEL SANCT. AREA - ZONE 1 ECO-2 INSTALL RIGID INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1074.	696.	1.000	35.	0.	0.	0	0	.0000	-.3757E+06
FEB	1494.	948.	1.000	37.	0.	0.	0	0	.2386E+05	-.3088E+06
MAR	1944.	1269.	1.000	43.	0.	0.	0	0	.1326E+06	-.3160E+06
APR	2323.	1608.	1.000	55.	0.	0.	0	0	.1548E+06	-.1859E+06
MAY	2570.	1829.	1.000	65.	0.	0.	0	0	.1982E+06	-.1225E+06
JUN	2646.	1993.	1.000	72.	0.	0.	0	0	.2731E+06	-.4357E+05
JUL	2549.	2018.	1.000	77.	0.	0.	0	0	.2841E+06	-.3275E+05
AUG	2291.	1849.	1.000	76.	0.	0.	0	0	.2691E+06	-.5529E+05
SEP	1878.	1388.	1.000	68.	0.	0.	0	0	.3120E+06	-.1171E+06
OCT	1467.	972.	1.000	57.	0.	0.	0	0	.2257E+06	-.1740E+06
NOV	1071.	754.	1.000	47.	0.	0.	0	0	.1593E+06	-.2452E+06
DEC	916.	627.	1.000	35.	0.	0.	0	0	.7189E+05	-.3858E+06

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 BASELINE

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 7.500000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA --------------

******REAL WEATHER FROM DISK*******

FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.000000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 29753.000000
FLOOR AREA (SQFT) 3189.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 120000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -180000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 31890.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 215.000000
INFILTRATION PROFILE

1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

A FACTOR IN INFILTRATION EQUATION (CINA) 4.340000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 13970.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 182.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 29.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	.0	929.0	358.0	822.0
WINDOW AREA SQFT (AWND)	.0	42.3	.0	106.0
WINDOW HEIGHT FT (WNDH)	.0	10.0	.0	10.0
WINDOW WIDTH FT (WNDW)	.0	4.2	.0	10.6
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.245	.245	.245
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01837	.01837	.01837	.01837
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00003	.00003	.00003	.00003
N=2	.00283	.00283	.00283	.00283
N=3	.01017	.01017	.01017	.01017
N=4	.00498	.00498	.00498	.00498
N=5	.00037	.00037	.00037	.00037
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	-.07415	-.07415	-.07415	-.07415
N=5	.00212	.00212	.00212	.00212
N=6	********	********	********	********

ROOF AREA SQFT (AROF) 3189.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 4.110000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 6.047439E-03
ROOF B TRANSFER FUNCTIONS (BNR)
.185E-05 .509E-03 .294E-02 .228E-02 .305E-03 .648E-05
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.33 .558 -.787E-01 .230E-02 999.
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 6.300000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	BTU/HR			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	4.	38839.	1225.	775.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.100	.000	.000	70.0	75.0
2	.100	.100	.000	.000	70.0	75.0
3	.100	.100	.000	.000	70.0	75.0
4	.100	.100	.000	.000	70.0	75.0
5	.100	.100	.000	.000	70.0	75.0
6	.100	.100	.000	.000	70.0	75.0
7	.100	.100	.000	.000	70.0	75.0
8	1.000	.400	1.000	1.000	70.0	75.0

```
   9        1.000      .300     1.000     1.000        70.0        75.0
  10        1.000      .300     1.000     1.000        70.0        75.0
  11         .800      .300     1.000     1.000        70.0        75.0
  12         .800      .300     1.000     1.000        70.0        75.0
  13        1.000      .300     1.000     1.000        70.0        75.0
  14        1.000      .300     1.000     1.000        70.0        75.0
  15        1.000      .300     1.000     1.000        70.0        75.0
  16        1.000      .300     1.000     1.000        70.0        75.0
  17        1.000      .100     1.000     1.000        70.0        75.0
  18         .100      .100      .000      .000        70.0        75.0
  19         .100      .100      .000      .000        70.0        75.0
  20         .100      .100      .000      .000        70.0        75.0
  21         .100      .100      .000      .000        70.0        75.0
  22         .100      .100      .000      .000        70.0        75.0
  23         .100      .100      .000      .000        70.0        75.0
  24         .100      .100      .000      .000        70.0        75.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       60.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)     4785.000000
ECONOMIZER HIGH TEMP LIMIT F     0.000000E+00
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR       24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     0.000000E+00
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  120000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   150000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .420      .100      .560      .200      .650      .300      .710      .400
 .740      .500      .750      .600      .760      .700      .780      .800
 .790      .900      .800     1.00
CHILLER TYPE (ITYPCH)            3
COOLING PLANT RATED OUTPUT BTU (CFLOT)   180000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    46075.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.22	GAIN	2.09	.00	.00	.00	.00	.00	.00	.07
	-31.33	LOSS		-3.80	-5.57	.00	-11.07	-2.06	-22.21	.00
FEB	.13	GAIN	2.68	.00	.00	.00	.02	.00	.00	.04
	-23.79	LOSS		-3.14	-4.73	.00	-8.21	-1.75	-18.86	.00
MAR	1.32	GAIN	3.32	.02	.00	.00	.46	.00	.00	.14
	-18.23	LOSS		-2.82	-4.40	.00	-6.49	-1.63	-16.87	.00
APR	6.01	GAIN	3.54	.13	.03	.00	1.67	.01	.11	.59
	-6.69	LOSS		-1.68	-2.61	.00	-3.09	-.97	-9.31	.00
MAY	13.60	GAIN	3.88	.33	.11	.00	3.23	.04	.30	2.21
	-1.05	LOSS		-1.03	-1.54	.00	-1.25	-.55	-4.63	.00
JUN	26.30	GAIN	3.89	.56	.31	.00	4.91	.11	.88	8.32
	.00	LOSS		-.55	-.67	.00	-.31	-.24	-1.88	.00
JUL	34.50	GAIN	4.01	.85	.72	.00	6.46	.27	2.20	10.81
	.00	LOSS		-.38	-.40	.00	-.14	-.14	-1.13	.00
AUG	31.61	GAIN	3.52	.68	.56	.00	5.38	.20	1.58	10.62
	-.02	LOSS		-.41	-.44	.00	-.17	-.16	-1.23	.00
SEP	19.09	GAIN	3.01	.31	.28	.00	2.93	.11	.91	6.38
	-1.57	LOSS		-.88	-1.18	.00	-1.15	-.43	-3.75	.00
OCT	5.12	GAIN	2.50	.06	.04	.00	.74	.02	.13	1.02
	-5.97	LOSS		-1.79	-2.49	.00	-3.57	-.90	-8.07	.00
NOV	1.44	GAIN	1.95	.00	.00	.00	.13	.00	.00	.25
	-14.64	LOSS		-2.54	-3.60	.00	-6.54	-1.31	-12.62	.00
DEC	.01	GAIN	1.78	.00	.00	.00	.00	.00	.00	.00
	-30.52	LOSS		-3.78	-5.46	.00	-11.22	-2.00	-21.13	.00
TOT	139.	GAIN	36.	3.	2.	0.	26.	1.	6.	40.
	-134.	LOSS		-23.	-33.	0.	-53.	-12.	-122.	0.

MAX HEATING LOAD= -120000. BTUH ON DEC 18 HOUR 7 AMBIENT TEMP -1.
MAX COOLING LOAD= 101332. BTUH ON JUL 27 HOUR 15 AMBIENT TEMP 92.

ZONE UA BTU/HR-F 768.7

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 BASELINE

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	COINCIDENT DAY	HR	AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	76.		5	15	64.	1.22	7.69	2.07	11.45
			69.	27	7	4.				
FEB	70.	76.		9	14	59.	1.10	6.89	1.87	10.28
			69.	2	7	14.				
MAR	71.	79.		25	17	56.	1.21	7.62	2.07	11.37
			69.	4	6	15.				
APR	73.	80.		3	17	58.	1.17	7.36	2.01	10.98
			69.	9	6	30.				
MAY	75.	82.		10	17	53.	1.22	7.69	2.07	11.45
			70.	11	6	39.				
JUN	75.	76.		29	16	87.	1.17	7.36	2.01	10.98
			70.	17	6	57.				
JUL	76.	76.		26	16	94.	1.21	7.62	2.07	11.37
			72.	10	6	60.				
AUG	75.	76.		29	16	95.	1.22	7.69	2.07	11.45
			70.	25	7	55.				
SEP	74.	76.		3	13	89.	1.16	7.29	2.01	10.90
			70.	15	6	39.				
OCT	73.	80.		24	15	59.	1.22	7.69	2.07	11.45
			69.	28	7	34.				
NOV	71.	77.		9	15	51.	1.18	7.42	2.01	11.06
			69.	3	7	18.				
DEC	70.	75.		23	16	67.	1.20	7.56	2.07	11.29
			69.	18	7	-1.				
YEAR							14.32	89.87	24.43	134.07

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 BASELINE

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	682	12	0	0	-.1147E+06	.2524E+05
FEB	565	8	0	0	-.9499E+05	.2410E+05
MAR	515	58	0	0	-.9710E+05	.4444E+05
APR	264	209	0	0	-.5708E+05	.5883E+05
MAY	63	402	0	0	-.3825E+05	.7272E+05
JUN	1	585	0	0	-41.20	.9257E+05
JUL	0	680	0	0	.0000	.1013E+06
AUG	3	672	0	0	-8627.	.9076E+05
SEP	84	455	0	0	-.3638E+05	.9288E+05
OCT	267	181	0	0	-.5279E+05	.6542E+05
NOV	470	68	0	0	-.7999E+05	.4583E+05
DEC	701	3	1	0	-.1200E+06	7995.
YEAR	3615	3333	1	0	-.1200E+06	.1013E+06

SYSTEM TOTALS

MONTH	ENERGY CONSUMPTION HEATING MILLION BTU	COOLING THOUSAND KWH	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FANS THOUSAND KWH	TOTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	16.89	.03	1.22	7.69	.61	11.45	7.6
FEB	12.37	.02	1.10	6.89	.55	10.28	7.5
MAR	9.85	.15	1.21	7.62	.61	11.37	9.4
APR	4.00	.67	1.17	7.36	.59	10.98	10.7
MAY	.95	1.48	1.22	7.69	.61	11.45	11.7
JUN	.02	2.74	1.17	7.36	.59	10.98	13.1
JUL	.00	3.52	1.21	7.62	.61	11.37	13.7
AUG	.05	3.28	1.22	7.69	.61	11.45	13.0
SEP	1.26	2.01	1.16	7.29	.59	10.90	12.7
OCT	4.01	.57	1.22	7.69	.61	11.45	11.2
NOV	7.72	.17	1.18	7.42	.59	11.06	9.6
DEC	17.05	.00	1.20	7.56	.61	11.29	4.7
YEAR	74.15	14.64	14.32	89.87	7.16	134.07	13.7

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 90086. BTU/(SQFT-YEAR)

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 BASELINE

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	-	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1074.	696.	1.000	35.	0.	0.	0	0	.2524E+05	-.1147E+06
FEB	1494.	948.	1.000	37.	0.	0.	0	0	.2410E+05	-.9499E+05
MAR	1944.	1269.	1.000	43.	0.	0.	0	0	.4444E+05	-.9710E+05
APR	2323.	1608.	1.000	55.	0.	0.	0	0	.5883E+05	-.5708E+05
MAY	2570.	1829.	1.000	65.	0.	0.	0	0	.7272E+05	-.3825E+05
JUN	2646.	1993.	1.000	72.	0.	0.	0	0	.9257E+05	-41.20
JUL	2549.	2018.	1.000	77.	0.	0.	0	0	.1013E+06	.0000
AUG	2291.	1849.	1.000	76.	0.	0.	0	0	.9076E+05	-8627.
SEP	1878.	1388.	1.000	68.	0.	0.	0	0	.9288E+05	-.3638E+05
OCT	1467.	972.	1.000	57.	0.	0.	0	0	.6542E+05	-.5279E+05
NOV	1071.	754.	1.000	47.	0.	0.	0	0	.4583E+05	-.7999E+05
DEC	916.	627.	1.000	35.	0.	0.	0	1	7995.	-.1200E+06

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 ECO-1 INSTALL FIBERGLASS INSULATION

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 7.500000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******

FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.000000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 29753.000000
FLOOR AREA (SQFT) 3189.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 120000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -180000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 31890.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 215.000000
INFILTRATION PROFILE

1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

A FACTOR IN INFILTRATION EQUATION (CINA) 4.340000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 13970.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 182.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 29.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	.0	929.0	358.0	822.0
WINDOW AREA SQFT (AWND)	.0	42.3	.0	106.0
WINDOW HEIGHT FT (WNDH)	.0	10.0	.0	10.0
WINDOW WIDTH FT (WNDW)	.0	4.2	.0	10.6
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.064	.064	.064	.064
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00176	.00176	.00176	.00176
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00016	.00016	.00016	.00016
N=3	.00086	.00086	.00086	.00086
N=4	.00066	.00066	.00066	.00066
N=5	.00008	.00008	.00008	.00008
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	-.16643	-.16643	-.16643	-.16643
N=5	.00728	.00728	.00728	.00728
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 3189.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 4.110000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 6.047439E-03
ROOF B TRANSFER FUNCTIONS (BNR)
.185E-05 .509E-03 .294E-02 .228E-02 .305E-03 .648E-05
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.33 .558 -.787E-01 .230E-02 999.
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 6.300000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	BTU/HR			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	4.	38839.	1225.	775.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.100	.000	.000	70.0	75.0
2	.100	.100	.000	.000	70.0	75.0
3	.100	.100	.000	.000	70.0	75.0
4	.100	.100	.000	.000	70.0	75.0
5	.100	.100	.000	.000	70.0	75.0
6	.100	.100	.000	.000	70.0	75.0
7	.100	.100	.000	.000	70.0	75.0
8	1.000	.400	1.000	1.000	70.0	75.0

```
  9        1.000      .300     1.000     1.000        70.0        75.0
 10        1.000      .300     1.000     1.000        70.0        75.0
 11         .800      .300     1.000     1.000        70.0        75.0
 12         .800      .300     1.000     1.000        70.0        75.0
 13        1.000      .300     1.000     1.000        70.0        75.0
 14        1.000      .300     1.000     1.000        70.0        75.0
 15        1.000      .300     1.000     1.000        70.0        75.0
 16        1.000      .300     1.000     1.000        70.0        75.0
 17        1.000      .100     1.000     1.000        70.0        75.0
 18         .100      .100      .000      .000        70.0        75.0
 19         .100      .100      .000      .000        70.0        75.0
 20         .100      .100      .000      .000        70.0        75.0
 21         .100      .100      .000      .000        70.0        75.0
 22         .100      .100      .000      .000        70.0        75.0
 23         .100      .100      .000      .000        70.0        75.0
 24         .100      .100      .000      .000        70.0        75.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       60.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)     4785.000000
ECONOMIZER HIGH TEMP LIMIT F     0.000000E+00
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     0.000000E+00
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  120000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   150000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .420      .100      .560      .200      .650      .300      .710      .400
 .740      .500      .750      .600      .760      .700      .780      .800
 .790      .900      .800     1.00
CHILLER TYPE (ITYPCH)            3
COOLING PLANT RATED OUTPUT BTU (CFLOT)   180000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    46075.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 ECO-1 INSTALL FIBERGLASS INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.33	GAIN	2.09	.00	.00	.00	.00	.00	.00	.09
	-23.37	LOSS		-3.82	-5.60	.00	-2.88	-2.07	-22.31	.00
FEB	.26	GAIN	2.68	.00	.00	.00	.00	.00	.00	.04
	-18.13	LOSS		-3.16	-4.77	.00	-2.17	-1.77	-19.01	.00
MAR	1.29	GAIN	3.32	.02	.00	.00	.03	.00	.00	.10
	-13.97	LOSS		-2.84	-4.43	.00	-1.61	-1.64	-16.99	.00
APR	5.35	GAIN	3.54	.13	.03	.00	.24	.01	.11	.57
	-5.16	LOSS		-1.69	-2.63	.00	-.66	-.98	-9.38	.00
MAY	11.72	GAIN	3.88	.33	.11	.00	.65	.04	.30	2.08
	-.75	LOSS		-1.03	-1.54	.00	-.14	-.55	-4.62	.00
JUN	22.64	GAIN	3.89	.56	.31	.00	1.19	.11	.88	8.04
	.00	LOSS		-.54	-.67	.00	.00	-.24	-1.88	.00
JUL	29.69	GAIN	4.01	.85	.73	.00	1.65	.27	2.21	10.65
	.00	LOSS		-.38	-.40	.00	.00	-.14	-1.12	.00
AUG	27.65	GAIN	3.52	.68	.56	.00	1.37	.20	1.58	10.49
	-.01	LOSS		-.41	-.44	.00	.00	-.16	-1.22	.00
SEP	17.36	GAIN	3.01	.31	.28	.00	.66	.11	.91	6.26
	-1.23	LOSS		-.88	-1.18	.00	-.17	-.43	-3.74	.00
OCT	5.18	GAIN	2.50	.06	.04	.00	.09	.02	.13	1.03
	-4.27	LOSS		-1.83	-2.54	.00	-.86	-.92	-8.27	.00
NOV	1.83	GAIN	1.95	.00	.00	.00	.00	.00	.00	.29
	-10.46	LOSS		-2.56	-3.64	.00	-1.69	-1.32	-12.75	.00
DEC	.08	GAIN	1.78	.00	.00	.00	.00	.00	.00	.00
	-22.43	LOSS		-3.79	-5.48	.00	-2.94	-2.01	-21.21	.00
TOT	123.	GAIN	36.	3.	2.	0.	6.	1.	6.	40.
	-100.	LOSS		-23.	-33.	0.	-13.	-12.	-123.	0.

MAX HEATING LOAD= -96070. BTUH ON DEC 18 HOUR 7 AMBIENT TEMP -1.
MAX COOLING LOAD= 88897. BTUH ON JUL 27 HOUR 15 AMBIENT TEMP 92.

ZONE UA BTU/HR-F 387.0

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 ECO-1 INSTALL FIBERGLASS INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL INTERNAL HEAT GAIN MILLION BTU
JAN	70.	76.		2	16	55.	1.22	7.69	2.07	11.45
			69.	27	7	4.				
FEB	71.	78.		26	15	59.	1.10	6.89	1.87	10.28
			69.	2	7	14.				
MAR	71.	78.		25	16	58.	1.21	7.62	2.07	11.37
			69.	4	6	15.				
APR	73.	80.		3	17	58.	1.17	7.36	2.01	10.98
			70.	14	6	29.				
MAY	75.	82.		10	16	55.	1.22	7.69	2.07	11.45
			70.	11	5	39.				
JUN	75.	76.		27	13	88.	1.17	7.36	2.01	10.98
			70.	17	6	57.				
JUL	75.	76.		16	13	91.	1.21	7.62	2.07	11.37
			72.	10	6	60.				
AUG	75.	76.		30	14	87.	1.22	7.69	2.07	11.45
			70.	25	7	55.				
SEP	74.	76.		30	16	54.	1.16	7.29	2.01	10.90
			70.	15	6	39.				
OCT	73.	81.		24	15	59.	1.22	7.69	2.07	11.45
			70.	28	5	31.				
NOV	71.	77.		9	15	51.	1.18	7.42	2.01	11.06
			69.	3	7	18.				
DEC	70.	76.		12	16	59.	1.20	7.56	2.07	11.29
			69.	18	7	-1.				
YEAR							14.32	89.87	24.43	134.07

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 ECO-1 INSTALL FIBERGLASS INSULATION

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	643	16	0	0	-.9433E+05	.2853E+05
FEB	524	13	0	0	-.7564E+05	.4029E+05
MAR	474	54	0	0	-.7885E+05	.4041E+05
APR	232	190	0	0	-.4470E+05	.5112E+05
MAY	58	359	0	0	-.2862E+05	.6722E+05
JUN	0	547	0	0	.0000	.8050E+05
JUL	0	661	0	0	.0000	.8890E+05
AUG	2	656	0	0	-5328.	.8238E+05
SEP	84	448	0	0	-.2792E+05	.8312E+05
OCT	226	186	0	0	-.4212E+05	.6312E+05
NOV	415	81	0	0	-.6173E+05	.4708E+05
DEC	651	9	0	0	-.9607E+05	.1453E+05
YEAR	3309	3220	0	0	-.9607E+05	.8890E+05

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	11.40	.04	1.22	7.69	.61	11.45	7.9
FEB	8.92	.03	1.10	6.89	.55	10.28	9.1
MAR	7.65	.15	1.21	7.62	.61	11.37	9.0
APR	3.48	.60	1.17	7.36	.59	10.98	10.0
MAY	.87	1.29	1.22	7.69	.61	11.45	11.3
JUN	.00	2.39	1.17	7.36	.59	10.98	12.3
JUL	.00	3.10	1.21	7.62	.61	11.37	12.9
AUG	.03	2.92	1.22	7.69	.61	11.45	12.4
SEP	1.26	1.85	1.16	7.29	.59	10.90	12.2
OCT	3.39	.58	1.22	7.69	.61	11.45	11.0
NOV	6.33	.21	1.18	7.42	.59	11.06	9.7
DEC	11.92	.01	1.20	7.56	.61	11.29	5.7
YEAR	55.26	13.18	14.32	89.87	7.16	134.07	12.9

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 82595. BTU/(SQFT-YEAR)

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 ECO-1 INSTALL FIBERGLASS INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1074.	696.	1.000	35.	0.	0.	0	0	.2853E+05	-.9433E+05
FEB	1494.	948.	1.000	37.	0.	0.	0	0	.4029E+05	-.7564E+05
MAR	1944.	1269.	1.000	43.	0.	0.	0	0	.4041E+05	-.7885E+05
APR	2323.	1608.	1.000	55.	0.	0.	0	0	.5112E+05	-.4470E+05
MAY	2570.	1829.	1.000	65.	0.	0.	0	0	.6722E+05	-.2862E+05
JUN	2646.	1993.	1.000	72.	0.	0.	0	0	.8050E+05	.0000
JUL	2549.	2018.	1.000	77.	0.	0.	0	0	.8890E+05	.0000
AUG	2291.	1849.	1.000	76.	0.	0.	0	0	.8238E+05	-5328.
SEP	1878.	1388.	1.000	68.	0.	0.	0	0	.8312E+05	-.2792E+05
OCT	1467.	972.	1.000	57.	0.	0.	0	0	.6312E+05	-.4212E+05
NOV	1071.	754.	1.000	47.	0.	0.	0	0	.4708E+05	-.6173E+05
DEC	916.	627.	1.000	35.	0.	0.	0	0	.1453E+05	-.9607E+05

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 ECO-2 INSTALL RIGID INSULATION

```
---------- PROGRAM CONTROL OPTIONS -----------
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)            1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)            0
WEEKEND INTERNAL GAINS FACTOR (WKEND)     7.500000E-01
LAST CASE FLAG (1=YES, 0=NO)  (LSTCS)            1
SKY CLEARNESS FACTOR (CLN)         1.000000
NUMBER OF ZONES (NZ)             1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)            0
--------- SITE AND BUILDING DATA --------------
******REAL WEATHER FROM DISK*******
 FILE NAME MO
STATION 13995   YEAR 1955
SITE LATITUDE DEG (AL1)        37.000000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)      1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)        56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN)        20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA)     6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF)     3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG)     2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO)        70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)        70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS)     9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW)     0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS)     29753.000000
FLOOR AREA (SQFT)      3189.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX)    120000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX)   -180000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA)     31890.000000
CONSTANT INFILTRATION RATE CFM (CFMI)       215.000000
INFILTRATION PROFILE
 1.00      1.00      1.00      1.00      1.00      1.00      1.00      1.00
 1.00      1.00      1.00      1.00      1.00      1.00      1.00      1.00
 1.00      1.00      1.00      1.00      1.00      1.00      1.00      1.00
A FACTOR IN INFILTRATION EQUATION (CINA)     4.340000E-01
B FACTOR IN INFILTRATION EQUATION (CINB)     2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC)     8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP)     13970.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF)     0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF)       182.000000
PARTITION UA BTU/HR-F (GUA)     0.000000E+00
DOOR UA BTU/HR-F (DUA)        29.000000
WINDOW GLASS NUMBER (NG)            30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO)     6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN)     6.930472E-01
WINDOW SHADING FACTOR (SHD)     5.900000E-01
```

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	.0	929.0	358.0	822.0
WINDOW AREA SQFT (AWND)	.0	42.3	.0	106.0
WINDOW HEIGHT FT (WNDH)	.0	10.0	.0	10.0
WINDOW WIDTH FT (WNDW)	.0	4.2	.0	10.6
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.055	.055	.055	.055
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00174	.00174	.00174	.00174
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00019	.00019	.00019	.00019
N=3	.00089	.00089	.00089	.00089
N=4	.00059	.00059	.00059	.00059
N=5	.00007	.00007	.00007	.00007
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	-.14508	-.14508	-.14508	-.14508
N=5	.00613	.00613	.00613	.00613
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 3189.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 4.110000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 6.047439E-03
ROOF B TRANSFER FUNCTIONS (BNR)
.185E-05 .509E-03 .294E-02 .228E-02 .305E-03 .648E-05
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.33 .558 -.787E-01 .230E-02 999.
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 6.300000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	4.	38839.	1225.	775.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.100	.000	.000	70.0	75.0
2	.100	.100	.000	.000	70.0	75.0
3	.100	.100	.000	.000	70.0	75.0
4	.100	.100	.000	.000	70.0	75.0
5	.100	.100	.000	.000	70.0	75.0
6	.100	.100	.000	.000	70.0	75.0
7	.100	.100	.000	.000	70.0	75.0
8	1.000	.400	1.000	1.000	70.0	75.0

```
   9        1.000      .300     1.000     1.000        70.0       75.0
  10        1.000      .300     1.000     1.000        70.0       75.0
  11         .800      .300     1.000     1.000        70.0       75.0
  12         .800      .300     1.000     1.000        70.0       75.0
  13        1.000      .300     1.000     1.000        70.0       75.0
  14        1.000      .300     1.000     1.000        70.0       75.0
  15        1.000      .300     1.000     1.000        70.0       75.0
  16        1.000      .300     1.000     1.000        70.0       75.0
  17        1.000      .100     1.000     1.000        70.0       75.0
  18         .100      .100      .000      .000        70.0       75.0
  19         .100      .100      .000      .000        70.0       75.0
  20         .100      .100      .000      .000        70.0       75.0
  21         .100      .100      .000      .000        70.0       75.0
  22         .100      .100      .000      .000        70.0       75.0
  23         .100      .100      .000      .000        70.0       75.0
  24         .100      .100      .000      .000        70.0       75.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       60.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)    4785.000000
ECONOMIZER HIGH TEMP LIMIT F    0.000000E+00
SYSTEM SUPPLY AIR START TIME HR    0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR       24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)    0.000000E+00
FAN EFFICIENCY (EFAN)    5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)    8.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  120000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   150000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .420      .100      .560      .200      .650      .300      .710      .400
 .740      .500      .750      .600      .760      .700      .780      .800
 .790      .900      .800     1.00
CHILLER TYPE (ITYPCH)           3
COOLING PLANT RATED OUTPUT BTU (CFLOT)   180000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    46075.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 ECO-2 INSTALL RIGID INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.34	GAIN	2.09	.00	.00	.00	.00	.00	.00	.09
	-22.99	LOSS		-3.82	-5.60	.00	-2.48	-2.07	-22.32	.00
FEB	.27	GAIN	2.68	.00	.00	.00	.00	.00	.00	.04
	-17.86	LOSS		-3.16	-4.77	.00	-1.87	-1.77	-19.02	.00
MAR	1.30	GAIN	3.32	.02	.00	.00	.03	.00	.00	.10
	-13.78	LOSS		-2.84	-4.44	.00	-1.39	-1.64	-17.00	.00
APR	5.35	GAIN	3.54	.13	.03	.00	.21	.01	.11	.55
	-5.10	LOSS		-1.69	-2.63	.00	-.58	-.98	-9.39	.00
MAY	11.64	GAIN	3.88	.33	.11	.00	.57	.04	.30	2.05
	-.76	LOSS		-1.03	-1.53	.00	-.12	-.55	-4.61	.00
JUN	22.43	GAIN	3.89	.56	.31	.00	1.03	.11	.88	7.99
	.00	LOSS		-.54	-.67	.00	.00	-.24	-1.87	.00
JUL	29.42	GAIN	4.01	.85	.73	.00	1.42	.27	2.21	10.60
	.00	LOSS		-.38	-.40	.00	.00	-.14	-1.12	.00
AUG	27.36	GAIN	3.52	.68	.56	.00	1.18	.20	1.58	10.39
	-.01	LOSS		-.41	-.44	.00	.00	-.16	-1.22	.00
SEP	17.23	GAIN	3.01	.31	.28	.00	.57	.11	.91	6.21
	-1.23	LOSS		-.88	-1.18	.00	-.15	-.43	-3.74	.00
OCT	5.17	GAIN	2.50	.06	.04	.00	.09	.02	.13	1.00
	-4.21	LOSS		-1.83	-2.55	.00	-.74	-.92	-8.29	.00
NOV	1.86	GAIN	1.95	.00	.00	.00	.00	.00	.00	.29
	-10.28	LOSS		-2.56	-3.64	.00	-1.46	-1.32	-12.76	.00
DEC	.08	GAIN	1.78	.00	.00	.00	.00	.00	.00	.00
	-22.04	LOSS		-3.79	-5.49	.00	-2.53	-2.01	-21.22	.00
TOT	122.	GAIN	36.	3.	2.	0.	5.	1.	6.	39.
	-98.	LOSS		-23.	-33.	0.	-11.	-12.	-123.	0.

MAX HEATING LOAD= -95219. BTUH ON DEC 18 HOUR 7 AMBIENT TEMP -1.
MAX COOLING LOAD= 88606. BTUH ON JUL 13 HOUR 14 AMBIENT TEMP 90.

ZONE UA BTU/HR-F 368.0

BEACON Energy Analysis By EMC Engineers, Inc. 637BRGD.I

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 ECO-2 INSTALL RIGID INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL INTERNAL HEAT GAIN MILLION BTU
JAN	70.	76.		2	16	55.	1.22	7.69	2.07	11.45
			69.	27	7	4.				
FEB	71.	78.		26	15	59.	1.10	6.89	1.87	10.28
			69.	2	7	14.				
MAR	71.	78.		25	16	58.	1.21	7.62	2.07	11.37
			69.	4	6	15.				
APR	73.	80.		3	17	58.	1.17	7.36	2.01	10.98
			70.	14	6	29.				
MAY	74.	82.		10	16	55.	1.22	7.69	2.07	11.45
			70.	11	5	39.				
JUN	75.	76.		27	13	88.	1.17	7.36	2.01	10.98
			70.	17	6	57.				
JUL	75.	76.		26	13	93.	1.21	7.62	2.07	11.37
			72.	10	6	60.				
AUG	75.	76.		30	14	87.	1.22	7.69	2.07	11.45
			70.	25	6	51.				
SEP	74.	76.		30	16	54.	1.16	7.29	2.01	10.90
			70.	15	6	39.				
OCT	73.	81.		24	15	59.	1.22	7.69	2.07	11.45
			70.	28	5	31.				
NOV	71.	77.		9	15	51.	1.18	7.42	2.01	11.06
			69.	3	7	18.				
DEC	70.	76.		12	16	59.	1.20	7.56	2.07	11.29
			69.	18	7	-1.				
YEAR							14.32	89.87	24.43	134.07

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 ECO-2 INSTALL RIGID INSULATION

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	641	16	0	0	-.9376E+05	.2876E+05
FEB	519	13	0	0	-.7504E+05	.4151E+05
MAR	469	54	0	0	-.7832E+05	.4051E+05
APR	228	190	0	0	-.4442E+05	.5106E+05
MAY	60	355	0	0	-.2853E+05	.6698E+05
JUN	1	542	0	0	-958.6	.8022E+05
JUL	0	657	0	0	.0000	.8861E+05
AUG	2	648	0	0	-6314.	.8213E+05
SEP	84	443	0	0	-.2778E+05	.8286E+05
OCT	223	185	0	0	-.4185E+05	.6309E+05
NOV	409	81	0	0	-.6113E+05	.4719E+05
DEC	649	9	0	0	-.9522E+05	.1500E+05
YEAR	3285	3193	0	0	-.9522E+05	.8861E+05

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	11.26	.04	1.22	7.69	.61	11.45	8.0
FEB	8.79	.03	1.10	6.89	.55	10.28	9.2
MAR	7.55	.15	1.21	7.62	.61	11.37	9.0
APR	3.42	.60	1.17	7.36	.59	10.98	10.0
MAY	.90	1.28	1.22	7.69	.61	11.45	11.3
JUN	.02	2.37	1.17	7.36	.59	10.98	12.3
JUL	.00	3.07	1.21	7.62	.61	11.37	12.8
AUG	.03	2.89	1.22	7.69	.61	11.45	12.4
SEP	1.26	1.83	1.16	7.29	.59	10.90	12.2
OCT	3.35	.58	1.22	7.69	.61	11.45	11.0
NOV	6.23	.22	1.18	7.42	.59	11.06	9.7
DEC	11.73	.01	1.20	7.56	.61	11.29	5.9
YEAR	54.53	13.08	14.32	89.87	7.16	134.07	12.8

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 82262. BTU/(SQFT-YEAR)

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 ECO-2 INSTALL RIGID INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1074.	696.	1.000	35.	0.	0.	0	0	.2876E+05	-.9376E+05
FEB	1494.	948.	1.000	37.	0.	0.	0	0	.4151E+05	-.7504E+05
MAR	1944.	1269.	1.000	43.	0.	0.	0	0	.4051E+05	-.7832E+05
APR	2323.	1608.	1.000	55.	0.	0.	0	0	.5106E+05	-.4442E+05
MAY	2570.	1829.	1.000	65.	0.	0.	0	0	.6698E+05	-.2853E+05
JUN	2646.	1993.	1.000	72.	0.	0.	0	0	.8022E+05	-958.6
JUL	2549.	2018.	1.000	77.	0.	0.	0	0	.8861E+05	.0000
AUG	2291.	1849.	1.000	76.	0.	0.	0	0	.8213E+05	-6314.
SEP	1878.	1388.	1.000	68.	0.	0.	0	0	.8286E+05	-.2778E+05
OCT	1467.	972.	1.000	57.	0.	0.	0	0	.6309E+05	-.4185E+05
NOV	1071.	754.	1.000	47.	0.	0.	0	0	.4719E+05	-.6113E+05
DEC	916.	627.	1.000	35.	0.	0.	0	0	.1500E+05	-.9522E+05

BUILDING MANAGER INTERVIEW

BUILDING INFORMATION:							
Building No:	637	Building Name:	Chapel				
Surveyed by:	AJN	Date:	11/6/95	Building Use:	Church Assembly / Offices		
Building Conta	Staff Sgt. Williams			Phone No:	596-0182		
Building Contact:				Phone No:			
OCCUPANCY:							
Number of Employees:	Mon./Fri.:	5	Schedule:	830	To	1700	
	Tues./Thurs	5		830	To	1700	
	Wed.	5		830	To	1700	
	Sat./Sun.	5		630	To	1230	
Visitors Per Day:	Mon./Fri.:		Schedule:		To		
	Tues./Thurs.				To		
	Wed.				To		
	Sat./Sun.	100		700	To	1230	
Comments:							
LIGHTING SCHEDULE:							
Normal Occupancy:	Mon.-Fri.:		Schedule:	830	To	1700	
	Sat./Sun.:			630	To	1230	
Cleaning Crew/2nd Shift:	Mon.-Fri.:		Schedule:		To		
	Sat./Sun.:				To		
EQUIPMENT SCHEDULE:							
Fan/AHU Schedule:	Mon.-Fri.:		Schedule:	0	To	2400	
	Sat./Sun.:			0	To	2400	
Chiller Schedule:	Mon.-Fri.:		Schedule:	0	To	2400	
	Sat./Sun.:			0	To	2400	
Boiler Schedule:	Mon.-Fri.:		Schedule:	0	To	2400	
	Sat./Sun.:			0	To	2400	
Aux. Equipment Schedule:							
	Mon.-Fri.:		Schedule:	0	To	2400	
	Sat./Sun.:			0	To	2400	
	Mon.-Fri.:		Schedule:	0	To	2400	
	Sat./Sun.:			0	To	2400	
Comments:							

Building No 637 **Building Name:** Chapel

BUILDING ENVELOPE

EXTERIOR WALLS

Wall Direction (N, E, W, or S)	Wall Construction No.	Comments
N	XW-1	
E	XW-1	
S	XW-1	
W	XW-1	

LIST OF EXT. WALL CONSTRUCTION TYPES

Wall Construction No.	Description
XW-1	Face Brick & CMU
XW-2	Face Brick, CMU, & Gyp. Board
XW-3	Face Brick, CMU, & Ceramic Tile
XW-4	Face Brick, CMU, & Plaster Coat
XW-5	Insulated Metal Panel

WINDOWS

Window Direction (N, E, W, or S)	Window Construction No.	Comments
N	W-1	
E	W-1	
S	W-1	
W	W-1	

LIST OF WINDOW TYPES

Window Construction No.	Description
W-1	Double Pane Clear
W-2	Double Pane Tinted
W-3	Single Pane with Storm Windows
W-4	Single Pane

ROOF CONSTRUCTION

Roof Location	Roof Construction No.	Comments
Admin. Area		
ALL	R-6	The 6" insulation consists of 3" fiberglass batt and 3" blown cellulose.
Santuary		
ALL	R-7	

LIST OF ROOF CONSTRUCTION TYPES

Roof Construction No.	Description
R-1	BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile
R-2	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Ceiling Tile
R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Clg
R-4	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plaster Clg.
R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceiling Tile
R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Hard Board
R-7	Asphalt Shingles, Rigid Insulation, Wood Decking

Building No 637 **Building Name:** Chapel

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

INTERIOR EQUIPMENT AND OBJECTS				LIST OF EQUIPMENT AND OBJECTS	
Wall Direction (N, E, W, or S)	Item No.	No. of Items	Comments	Item No.	Description
					Architectural
Office Area				A-1	Interior Partitions
W	M-5	3		A-2	Wall Placards
W	E-2	2		A-3	Drapery Valances
				A-4	Drapery Rods
N	M-5	5		A-5	Speakers
N	A-4	5		A-6	Cabinets
N	E-3	1		A-7	Wall Cabinet
S	E-2	2			**Plumbing**
S	P-1	1		P-1	Sinks
S	A-4	4		P-2	Commodes
S	M-5	6		P-3	Toilet Stalls
S	A-6	1		P-4	Water Fountains
S	P-2	2			
S	A-7	1			**HVAC Mechanical**
			Glazed structural block in kitchen area	M-1	Floor Supply/Return Grilles
			approx. area 15'x10'.	M-2	Ceiling Supply/Return Grilles
			Glazed structural block 5'-0" A.F.F. in	M-3	Finned-Tube Baseboard Radiators
			latrine.	M-4	Thermostats / Space Temp. Sensors
Santuary Area				M-5	Fan Coil Unit
W	A-4	3			
					Electrical
N	M-1	4		E-1	Electrical Panels
N	A-5	2		E-2	Electrical Outlets
N	A-4	4		E-3	Electrical Light Switches
N	A-2	6		E-4	Wall Mounted Television
E	A-5	2			
E	A-2	6			
E	M-1	8			**Lighting**
E	E-3	1		L-1	Wall Mounted Fixtures
E	A-4	8		L-2	Ceiling Mounted Fixtures
				L-3	Exit Signs
					Fire Protection
				F-1	Alarm Pull Switches
				F-2	Alarm Sound Devices (Speakers, Bells)
				F-3	Sprinkler Heads
				F-4	Fire Extinguishes
					Communication
				C-1	Telephones - Wall Mounted
				C-2	Telephones - Booth Mounted
				C-3	Telephone Jacks

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
BLDG: **637**
FILE: **637AH1**

AIR HANDLING UNIT SURVEY OBSERVATIONS

AHU-1	AHU NO.	**MECH. ROOM**	LOCATION (RM)
CH-1	REF. SYS. SERVING AHU	**CHAPEL SANCTUARY (ZN1)**	SERVES AREA

UNIT TYPE:

X	SINGLE ZN		2-PIPE FC		4-PIPE FC		UNIT HTR		H&V
	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION		VAV
	NUMBER OF ZONES				OTHER				
	COMMENT:								

NAMEPLATE:

DUNHAM-BUSH					MFG.	**VAH603**			MODEL
10.0	SUPPLY FAN HP		**NO NAME PLATE**		MFG.				MODEL
	RET/EXH FAN HP				MFG.				MODEL
6970	CFM-HTG	**6970**	CFM-CLG	**10%**	MIN %OA	**100%**	MAX %OA	**100%**	% HTG AREA SERVED
COMMENT:									

COILS:

X	NONE		STM		HW		ELEC		MOD VLV	PREHEAT
	NONE		STM	X	HW		ELEC	X	MOD VLV	HEATING
X	NONE		STM		HW		ELEC		MOD VLV	REHEAT
X	NONE		STM		HW		ELEC		MOD VLV	HUMID.
	NONE	X	DX		CW			X	MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	**YES,**
REQUIRED START TIME								**NO PINS**
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	1	1	1	1	1	1	1	1

CONTROLS:

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK			**PNEUMATIC**
SPACE SETPOINT (oF):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	**ACTUATORS**
OTHER SETPOINTS (oF):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	**N**	MIN OA (Y/N)	**Y**	MAX OA (Y/N)	**Y**	RA (Y/N)	**N**	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:	**Y**	YES		NO					
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
BLDG: **637**
FILE: **637FC1**

AIR HANDLING UNIT SURVEY OBSERVATIONS

FC-1	AHU NO.	**OFFICE AREA (ZN2)**	LOCATION (RM)
CH-2	REF. SYS. SERVING AHU	**OFFICE AREA (ZN2)**	SERVES AREA

UNIT TYPE:

	SINGLE ZN	X	2-PIPE FC		4-PIPE FC		UNIT HTR		H&V
	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION		VAV
	NUMBER OF ZONES				OTHER				
	COMMENT:								

NAMEPLATE:

DUNHAM-BUSH					MFG.	**NO NAME PLATE**			MODEL
2.3	SUPPLY FAN HP				MFG.				MODEL
0.0	RET/EXH FAN HP				MFG.				MODEL
4785	CFM-HTG	**4785**	CFM-CLG	**0%**	MIN %OA		MAX %OA	**100.0%**	% HTG AREA SERVED
COMMENT:	**TOTAL CFM FOR ALL FAN COILS; TWO-PIPE FAN COIL IN EACH ROOM;**								

COILS:

X	NONE		STM		HW		ELEC		MOD VLV	PREHEAT
	NONE		STM	X	HW		ELEC		MOD VLV	HEATING
X	NONE		STM		HW		ELEC		MOD VLV	REHEAT
X	NONE		STM		HW		EVAP MEDIA		MOD VLV	HUMID.
	NONE		DX	X	CW				MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK? **NO**
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	**CONTROLLED BY**
REQUIRED START TIME								**OCCUPANT**
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	1	1	1	1	1	1	1	1

CONTROLS:

		PNEUMATIC	X	ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK			
SPACE SETPOINT (°F):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:		MIN OA (Y/N)		MAX OA (Y/N)		RA (Y/N)		EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:		YES	**N**	NO					
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE: **637CH1**

BLDG: **637**

REFRIGERATION EQUIPMENT SURVEY OBSERVATIONS

CH-1	CHILLER/COMPRESSOR NO.	OUTSIDE BLDG	LOCATION (RM)

UNIT TYPE:

	CENTRIFUGAL WITH WATER SIDE COOLING TOWER						OTHER	
	RECIPROCATING WITH WATER SIDE COOLING TOWER					X	AHU'S SERVED	**AHU-1** **(ZN1)**
X	RECIPROCATING WITH AIR COOLED CONDENSING UNIT							
	ABSORBTION WITH WATER SIDE COOLING TOWER							
	AIR COOLED CONDENSING UNIT							
	CHW	X	DX		OTHER			

NAMEPLATE:

CHILLER	**McQUAY**	MFG.	**STO30A1500**			MODEL	**5SC0803600**			SERIAL NO.
230	VOLTS	**61.8**	AMPS	**3**	PH	**60**	HZ	**30**	CAPACITY (TONS)	
CONDENSER FANS		MFG.				MODEL			**4**	# OF FANS
230	VOLTS	**4**	AMPS	**3**	PH	**60**	HZ	**1**	HP	
DTW PUMP		MFG.				MODEL				SERIAL NO.
	VOLTS		AMPS		PH		HZ		HP	
CNW PUMP		MFG.				MODEL				SERIAL NO.
	VOLTS		AMPS		PH		HZ		HP	
COMMENTS:										

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	**0**	**0**	**0**	**0**	**0**	**0**	**0**	TIMECLOCK?
PRESENT STOP TIME	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**NO TIMECLOCK**
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
0	**0**	**0**	**0**	**1**	**1**	**1**	**1**	**1**	**0**	**0**	**0**

CONTROLS:

		PNEUMATIC	X	ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		CWS (oF)		CWR (oF)		CNWS (oF)		CNWR (oF)	
PANEL INDICATORS									
- PRESSURE		LITE-HI		LITE-LOW		GAUGES			
- TEMPERATURE		LITE-HI		LITE-LOW		GAUGES			
- OTHER									
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE: **637CH2**

BLDG: **637**

REFRIGERATION EQUIPMENT SURVEY OBSERVATIONS

CH-2	CHILLER/COMPRESSOR NO.	OUTSIDE BLDG	LOCATION (RM)

UNIT TYPE:

	CENTRIFUGAL WITH WATER SIDE COOLING TOWER					OTHER	
	RECIPROCATING WITH WATER SIDE COOLING TOWER				X	AHU'S SERVED	FC-1 (ZN2)
X	RECIPROCATING WITH AIR COOLED CONDENSING UNIT						
	ABSORBTION WITH WATER SIDE COOLING TOWER						
	AIR COOLED CONDENSING UNIT						
X	CHW		DX		OTHER		

NAMEPLATE:

CHILLER	McQUAY	MFG.	ALR020A			MODEL	5SC0714100			SERIAL NO.
208	VOLTS	80	AMPS	3	PH	60	HZ	20	CAPACITY (TONS)	
CONDENSER FANS		MFG.				MODEL			3	# OF FANS
208	VOLTS	4.4	AMPS	1	PH	60	HZ	0.75	HP	
DTW PUMP		MFG.	NO NAME PLATE			MODEL				SERIAL NO.
	VOLTS		AMPS		PH		HZ	0.75	HP	
CNW PUMP		MFG.				MODEL				SERIAL NO.
	VOLTS		AMPS		PH		HZ		HP	
COMMENTS:										

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	NO TIMECLOCK
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
0	0	0	0	1	1	1	1	1	0	0	0

CONTROLS:

		PNEUMATIC	X	ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		CWS (oF)		CWR (oF)		CNWS (oF)		CNWR (oF)	
PANEL INDICATORS									
- PRESSURE		LITE-HI		LITE-LOW		GAUGES			
- TEMPERATURE		LITE-HI		LITE-LOW		GAUGES			
- OTHER									

COMMENTS: **HAS FM SWITCH AND FLOW SWITCH**

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: DMS
CHECKED BY: AJN
BLDG: 637
FILE: 637CV1

BOILER & CONVERTER SURVEY OBSERVATIONS

CV-1	BOILER/CONVERTER NO.	MECH. RM.	LOCATION (RM)
C. PLANT	SOURCE OF HEATING (PLANT)	CHAPEL SANCTUARY (ZN1)	SERVES AREA

UNIT TYPE:

X	STEAM		PSIG		HW		TEMP.		BOILER TYPE:
	NO.2 OIL		NO.6 OIL		N.GAS		ELEC		FUELS:
X	STM/HW		HTHW/HW		HTHW/STM		OTHER	S&T	CONVERTER TYPE:
	SPACE HEAT		DHW		OTHER				USE:
COMMENT:							0%	% HTG AREA SERVED	
								BB RADIATION ONLY	

NAMEPLATE:

NO NAME PLATE	MFG.		MODEL	475000	CAPACITY OUTPUT (BTUH)
				475000	CAPACITY INPUT (BTUH)
	MFG.		MODEL		CAPACITY OUTPUT (BTUH)
					CAPACITY INPUT (BTUH)
1	HW PUMP 1 - HP	CENTURY	MFG.	NO NAME PLATE	MODEL
	HW PUMP 2 - HP		MFG.		MODEL
1	COND. PUMP - HP	DAYTON	MFG.	NO NAME PLATE	MODEL
COMMENT:					

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	NO TIMECLOCK
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	0	0	0	0	0	1	1	1

CONTROLS:

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		PSIG		HW SUPPLY					
RESET CONTROL (oF):		HW HIGH		HW LOW		OA LOW		OA HIGH	
BURNER CONTROLS		O2 TRIM (Y/N)		OTHER					
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
BLDG: **637**
FILE: **637CV2**

BOILER & CONVERTER SURVEY OBSERVATIONS

CV-2	BOILER/CONVERTER NO.	**MECH. RM.**	LOCATION (RM)
C. PLANT	SOURCE OF HEATING (PLANT)	**OFFICE AREA (ZN2)**	SERVES AREA

UNIT TYPE:

X	STEAM		PSIG		HW		TEMP.		BOILER TYPE:
	NO.2 OIL		NO.6 OIL		N.GAS		ELEC		FUELS:
X	STM/HW		HTHW/HW		HTHW/STM		OTHER	**S&T**	CONVERTER TYPE:
	SPACE HEAT		DHW		OTHER				USE:
COMMENT:	**EXP. TANK IS WATER LOGGED**						**0%**	% HTG AREA SERVED	
	DUAL TEMPERATURE SYSTEM							BB RADIATION ONLY	

NAMEPLATE:

NO NAME PLATE	MFG.		MODEL	**120000**	CAPACITY OUTPUT (BTUH)
				120000	CAPACITY INPUT (BTUH)
	MFG.		MODEL		CAPACITY OUTPUT (BTUH)
					CAPACITY INPUT (BTUH)
0.75	HW PUMP 1 - HP	**NO NAME PLATE**	MFG.		MODEL
	HW PUMP 2 - HP		MFG.		MODEL
	COND. PUMP - HP		MFG.		MODEL
COMMENT:	**PUMP AND CONVERTER ARE VERY OLD**				

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	**NO TIMECLOCK**
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	0	0	0	0	0	1	1	1

CONTROLS:

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		PSIG		HW SUPPLY					
RESET CONTROL (oF):		HW HIGH		HW LOW		OA LOW		OA HIGH	
BURNER CONTROLS		O2 TRIM (Y/N)		OTHER					
COMMENTS:									

ANNUAL ENERGY SAVINGS SUMMARY
FOR MESS HALL's - BUILDINGS 630, 632, 653, 657, 735, 739, 749, 754, 820, 821, 836, 837, 1010, 1011, & 1027

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Baseline Annual Electric (MBtu)	ECO 1 - Annual Electric (MBtu)	Annual Electric Energy Savings (MBtu)	Baseline Peak Electric Demand (kW)	ECO 1 - Peak Electric Demand (kW)	Peak Electric Demand Savings (kW)	Baseline Nat. Gas Energy Savings (MBtu)	ECO 1 - Annual Nat. Gas (MBtu)	Annual Nat. Gas Energy Savings (MBtu)
630	133.11	124.44	8.67	44.20	42.70	1.50	2815.03	2682.02	133.01

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 630 (SF)	Square Foot Adjust-ment Factor	Annual Electric Energy Savings (MBtu)	Adjusted Annual Electric Energy Savings* (MBtu)	Peak Electric Demand Savings (kW)	Adjusted Peak Electric Demand Savings* (kW)	Annual Nat. Gas Energy Savings (MBtu)	Adjusted Annual Nat. Gas Energy Savings* (MBtu)
632	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
653	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
657	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
735	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
739	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
749	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
754	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
820	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
821	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
836	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
837	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
1010	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
1011	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
1027	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01

*Energy savings prorated on a square foot basis

ANNUAL ENERGY SAVINGS SUMMARY
FOR MESS HALL's - BUILDINGS 630, 632, 653, 657, 735, 739, 749, 754, 820, 821, 836, 837, 1010, 1011, & 1027

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Baseline Annual Electric (MBtu)	ECO 2 - Annual Electric (MBtu)	Annual Electric Energy Savings (MBtu)	Baseline Peak Electric Demand (kW)	ECO 2 - Peak Electric Demand (kW)	Peak Electric Demand Savings (kW)	Baseline Annual Nat. Gas (MBtu)	ECO 2 - Annual Nat. Gas (MBtu)	Annual Nat. Gas Energy Savings (MBtu)
630	133.11	124.03	9.08	44.20	42.70	1.50	2815.03	2676.19	138.84

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 630 (SF)	Square Foot Adjust-ment Factor	Annual Electric Energy Savings (MBtu)	Adjusted Annual Electric Energy Savings* (MBtu)	Peak Electric Demand Savings (kW)	Adjusted Peak Electric Demand Savings* (kW)	Annual Nat. Gas Energy Savings (MBtu)	Adjusted Annual Nat. Gas Energy Savings* (MBtu)
632	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
653	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
657	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
735	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
739	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
749	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
754	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
820	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
821	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
836	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
837	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
1010	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
1011	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
1027	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84

*Energy savings prorated on a square foot basis

INVESTMENT COST SUMMARY
FOR MESS HALL's - BUILDINGS 630, 632, 653, 657, 735, 739, 749, 754, 820, 821, 836, 837, 1010, 1011, & 1027

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Investment Cost ($)
630	$54,215

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 630 (SF)	Square Foot Adjust-ment Factor	Investment Cost ($)	Adjusted Investment Cost ($)*
632	13,280	13,280	1.000	$54,215	$54,215
653	13,280	13,280	1.000	$54,215	$54,215
657	13,280	13,280	1.000	$54,215	$54,215
735	13,280	13,280	1.000	$54,215	$54,215
739	13,280	13,280	1.000	$54,215	$54,215
749	13,280	13,280	1.000	$54,215	$54,215
754	13,280	13,280	1.000	$54,215	$54,215
820	13,280	13,280	1.000	$54,215	$54,215
821	13,280	13,280	1.000	$54,215	$54,215
836	13,280	13,280	1.000	$54,215	$54,215
837	13,280	13,280	1.000	$54,215	$54,215
1010	13,280	13,280	1.000	$54,215	$54,215
1011	13,280	13,280	1.000	$54,215	$54,215
1027	13,280	13,280	1.000	$54,215	$54,215

*Investment Cost prorated on a square foot basis

INVESTMENT COST SUMMARY
FOR MESS HALL's - BUILDINGS 630, 632, 653, 657, 735, 739, 749, 754, 820, 821, 836, 837, 1010, 1011, & 1027

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Investment Cost ($)
630	$55,748

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 630 (SF)	Square Foot Adjust-ment Factor	Investment Cost ($)	Adjusted Investment Cost ($)*
632	13,280	13,280	1.000	$55,748	$55,748
653	13,280	13,280	1.000	$55,748	$55,748
657	13,280	13,280	1.000	$55,748	$55,748
735	13,280	13,280	1.000	$55,748	$55,748
739	13,280	13,280	1.000	$55,748	$55,748
749	13,280	13,280	1.000	$55,748	$55,748
754	13,280	13,280	1.000	$55,748	$55,748
820	13,280	13,280	1.000	$55,748	$55,748
821	13,280	13,280	1.000	$55,748	$55,748
836	13,280	13,280	1.000	$55,748	$55,748
837	13,280	13,280	1.000	$55,748	$55,748
1010	13,280	13,280	1.000	$55,748	$55,748
1011	13,280	13,280	1.000	$55,748	$55,748
1027	13,280	13,280	1.000	$55,748	$55,748

*Investment Cost prorated on a square foot basis

LIFE CYCLE COST ANALYSIS SUMMARY

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Leonard Wood	REGION: 2 (Missouri)		PROJECT NO:	1406-011
PROJECT TITLE:	Limited Energy Study, Insulate Brick Buildings			FISCAL YEAR:	1996
ANALYSIS DATE:	02/18/96	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz

1. INVESTMENT: **BLDG. 630 - INSTALL 3.5" FIBERGLASS BATT INSULATION ON WALLS**

A.	CONSTRUCTION COST	=	$47,978	
B.	SIOH COST	(7.0% of 1A) =	$3,358	
C.	DESIGN COST	(6.0% of 1A) =	$2,879	
D.	TOTAL COST	(1A +1B +1C) =	$54,215	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT	=	$0	
F.	PUBLIC UTILITY COMPANY REBATE	=	$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$54,215

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96

	ENERGY SOURCE	FUEL COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$7.33	8.67	$64	13.80	$876	
B.	DIST	$0.00	0	$0	0.00	$0	
C.	NAT GAS	$5.30	133.01	$705	17.76	$12,520	
D.	COAL	$0.00	0	$0	0.00	$0	
E.	ELEC. DEMAND			$111	13.47	$1,500	
F.	TOTAL		141.68	$880		-------->	$14,896

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1	ANNUAL MAINTENANCE	$0	$0
2		$0	$0
3		$0	$0
4	TOTAL ANNUAL DISC. SAVINGS (+) / COST	$0	$0

B. NON-RECURRING (+/-)

	ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)
a.	BASELINE EQUIP. REPLCMNT.				$0
b.					$0
c.					$0
d.					$0
e.					$0
f.	TOTAL	$0			$0

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = $0

4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3 + 3A4 + (3Bf1/Economic Life)) $880

5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = 61.62

6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) = $14,896

7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.27
   (MUST HAVE SIR > 1.25 TO QUALIFY)

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	SHEET 1	OF 1
ENGINEER	E M C Engineers, Inc. Denver, CO	DATE PREPARED	18-Feb-96
		ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST			LABOR COST			TOTAL
				Quantity	Unit Cost	Total	Crew/ Worker	Hours/ Unit	Total	
1		**BUILDING 630**								
2		**INSTALL 3.5" BATT INSULATION ON WALLS**								
3										
4	I3-1/2I	INSTALL 3-1/2" BATT INSULATION	S.F.	6971.0	$0.18	$1,264	1-CARP	0.007	$1,282	$2,546
5	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	6971.0	$0.20	$1,397	2-CARP	0.017	$6,227	$7,624
6	ISW	INSTALL 2"x4" STUDDED WALL 2' OC	L.F.	4299.0	$0.24	$1,013	F-2	0.009	$2,132	$3,145
7	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	6971.0	$0.07	$465.52	1-PORD	0.01	$1,683	$2,148
8	R12WMH	RELOCATE 12' BASEBOARD RADIATION	EA.	2.0	$18.39	$36.79	Q-6	5.25	$918	$955
9	R24WMH	RELOCATE 24' BASEBOARD RADIATION	EA.	4.0	$18.39	$73.57	Q-6	5.68	$1,987	$2,061
10	R6WMH	RELOCATE 6' BASEBOARD RADIATION	EA.	2.0	$18.39	$36.79	Q-6	4.68	$819	$855
11	REJB	RELOCATE ELECTRICAL JUNCTION BOX	EA.	2.0	$7.82	$15.65	1-ELEC	1.3	$79	$95
12	REL	RELOCATE EMERGENCY LIGHT	EA.	1.0	$0.00	$0.00	1-ELEC	3.25	$99	$99
13	REO	RELOCATE ELECTRICAL OUTLET	EA.	2.0	$7.97	$15.93	1-ELEC	0.896	$55	$70
14	RFE	RELOCATE FIRE EXTINGUISHER	EA.	1.0	$0.00	$0.00	1-CARP	0.2	$5	$5
15	RLKS	RELOCATE LARGE KITCHEN SINK	EA.	2.0	$71.07	$142.15	Q-1	16.751	$1,887	$2,030
16	RSD	RELOCATE SOAP DISPENSER	EA.	1.0	$0.00	$0.00	1-CARP	0.7	$18	$18
17	RT	RELOCATE THERMOSTAT	EA.	1.0	$0.00	$0.00	1-ELEC	1.7	$52	$52
18	RTS	RELOCATE TOILET STALL	EA.	2.0	$0.00	$0.00	2-CARP	3.536	$372	$372
19	RWP	RELOCATE 1/2" HW & CW DOMESTIC PIPING	EA.	1.0	$25.05	$25.05	Q-1	4.546	$256	$281
20	RWPL	RELOCATE WALL PLACARD	EA.	2.0	$0.00	$0.00	1-CARP	0.654	$34	$34
21	RWTC	RELOCATE WATER CLOSET	EA.	2.0	$35.83	$71.66	Q-2	10.904	$1,911	$1,983
22	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	L.F.	274.0	$1.14	$313.68	1-CARP	0.134	$965	$1,278
23	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	136.0	$0.84	$114.24	2-CARP	0.02	$143	$257
24	IWB-5/8	INSTALL 5/8" WATERPRF BRD - TAPED & SANDE	S.F.	402.0	$0.96	$383.91	2-CARP	0.02	$422	$806
25	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	538.0	$1.83	$985.44	2-TILE	0.084	$2,189	$3,174
26										
27		**SUBTOTAL**				$6,354			$23,536	$29,889
28	DIFF	DIFFICULTLY FACTOR			5%				$1,177	$1,177
29		**SUBTOTAL**				$6,354			$24,712	$31,066
30	PRO	PROFIT			10%	$635			$2,471	$3,107
31		**SUBTOTAL**				$6,989			$27,184	$34,173
32	OH	OVERHEAD			17%	$1,188			$4,621	$5,809
33		**SUBTOTAL**				$8,177			$31,805	$39,982
34	CONT	CONTINGENCY			20%	$1,635			$6,361	$7,996
35	**TOTAL COST**					$9,812			$38,166	$47,978

LIFE CYCLE COST ANALYSIS SUMMARY

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Leonard Wood	REGION: 2 (Missouri)		PROJECT NO:	1406-011
PROJECT TITLE:	Limited Energy Study, Insulate Brick Buildings			FISCAL YEAR:	1996
ANALYSIS DATE:	02/18/96	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz

1. INVESTMENT: **BLDG 630 - INSTALL 1.5" RIGID INSULATION ON WALLS**

A.	CONSTRUCTION COST	=	$49,334	
B.	SIOH COST	(7.0% of 1A) =	$3,453	
C.	DESIGN COST	(6.0% of 1A) =	$2,960	
D.	TOTAL COST	(1A +1B +1C) =	$55,748	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT =		$0	
F.	PUBLIC UTILITY COMPANY REBATE =		$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$55,748

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96

	ENERGY SOURCE	FUEL COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$7.33	9.08	$67	13.80	$918	
B.	DIST	$0.00	0	$0	0.00	$0	
C.	NAT GAS	$5.30	138.84	$736	17.76	$13,069	
D.	COAL	$0.00	0	$0	0.00	$0	
E.	ELEC. DEMAND			$111	13.47	$1,500	
F.	TOTAL		147.92	$914		-------->	$15,486

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1	ANNUAL MAINTENANCE	$0	$0
2		$0	$0
3		$0	$0
4	TOTAL ANNUAL DISC. SAVINGS (+) / COST	$0	$0

B. NON-RECURRING (+/-)

ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)
a. BASELINE EQUIP. REPLCMNT.				$0
b.				$0
c.				$0
d.				$0
e.				$0
f. TOTAL	$0			$0

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = $0

4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3 + 3A4 + (3Bf1/Economic Life)) $914

5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = 61.01

6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) = $15,486

7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.28
   (MUST HAVE SIR > 1.25 TO QUALIFY)

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulating Brick Buildings, Fort Leonard Wood, MO	SHEET 1	OF 1
ENGINEER	E M C Engineers, Inc.	DATE PREPARED	18-Feb-96
	Denver, CO	ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST			LABOR COST			TOTAL
				Quantity	Unit Cost	Total	Crew/ Worker	Hours/ Unit	Total	
1		**BUILDING 630**								
2		**INSTALL 1.5" RIGID INSULATION ON WALLS**								
3										
4	I1-1/2RI	INSTALL 1-1/2" RIGID INSULATION	S.F.	6971.0	$0.59	$4,123.21	1-CARP	0.008	$1,465	$5,588
5	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	6433.0	$0.20	$1,288.79	2-CARP	0.017	$5,746	$7,035
6	IFS	INSTALL 3/4"x2" FURRING STRIPS	L.F.	2674.0	$0.19	$510.20	1-CARP	0.016	$1,124	$1,634
7	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	6971.0	$0.07	$465.52	1-PORD	0.01	$1,683	$2,148
8	R12WMH	RELOCATE 12' BASEBOARD RADIATION	EA.	2.0	$18.39	$36.79	Q-6	5.25	$918	$955
9	R24WMH	RELOCATE 24' BASEBOARD RADIATION	EA.	4.0	$18.39	$73.57	Q-6	5.68	$1,987	$2,061
10	R6WMH	RELOCATE 6' BASEBOARD RADIATION	EA.	2.0	$18.39	$36.79	Q-6	4.68	$819	$855
11	REJB	RELOCATE ELECTRICAL JUNCTION BOX	EA.	2.0	$7.82	$15.65	1-ELEC	1.3	$79	$95
12	REL	RELOCATE EMERGENCY LIGHT	EA.	1.0	$0.00	$0.00	1-ELEC	3.25	$99	$99
13	REO	RELOCATE ELECTRICAL OUTLET	EA.	2.0	$7.97	$15.93	1-ELEC	0.896	$55	$70
14	RFE	RELOCATE FIRE EXTINGUISHER	EA.	1.0	$0.00	$0.00	1-CARP	0.2	$5	$5
15	RLKS	RELOCATE LARGE KITCHEN SINK	EA.	2.0	$71.07	$142.15	Q-1	16.751	$1,887	$2,030
16	RSD	RELOCATE SOAP DISPENSER	EA.	1.0	$0.00	$0.00	1-CARP	0.7	$18	$18
17	RT	RELOCATE THERMOSTAT	EA.	1.0	$0.00	$0.00	1-ELEC	1.7	$52	$52
18	RTS	RELOCATE TOILET STALL	EA.	2.0	$0.00	$0.00	2-CARP	3.536	$372	$372
19	RWP	RELOCATE 1/2" HW & CW DOMESTIC PIPING	EA.	1.0	$25.05	$25.05	Q-1	4.546	$256	$281
20	RWPL	RELOCATE WALL PLACARD	EA.	2.0	$0.00	$0.00	1-CARP	0.654	$34	$34
21	RWTC	RELOCATE WATER CLOSET	EA.	2.0	$35.83	$71.66	Q-2	10.904	$1,911	$1,983
22	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	L.F.	274.0	$1.14	$313.68	1-CARP	0.134	$965	$1,278
23	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	136.0	$0.84	$114.24	2-CARP	0.02	$143	$257
24	IWB-5/8	INSTALL 5/8" WATERPRF BRD - TAPED & SANDE	S.F.	402.0	$0.96	$383.91	2-CARP	0.02	$422	$806
25	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	538.0	$1.83	$985.44	2-TILE	0.084	$2,189	$3,174
26										
27		**SUBTOTAL**				$8,603			$22,230	$30,833
28	DIFF	DIFFICULTLY FACTOR			5%				$1,112	$1,112
29		**SUBTOTAL**				$8,603			$23,342	$31,944
30	PRO	PROFIT			10%	$860			$2,334	$3,194
31		**SUBTOTAL**				$9,463			$25,676	$35,139
32	OH	OVERHEAD			17%	$1,609			$4,365	$5,974
33		**SUBTOTAL**				$11,072			$30,041	$41,112
34	CONT	CONTINGENCY			20%	$2,214			$6,008	$8,222
35	**TOTAL COST**					$13,286			$36,049	$49,334

E M C ENGINEERS, INC.

DATE: Feb-96

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS BY: DMS

CLIENT CONTRACT NO.: DACA 01-94D-0033 JOB: 1406.011

LOCATION: FT LEONARD WOOD, MO. CHK: AJN

FILE: 630Z1BHL

BUILDING HEATING LOAD CALCULATION SHEET

BLDG NO: 630 BLDG NAME: MESS HALL - ZONE 1

BLDG FUNCTION: KITCHEN AREA

FLOOR AREA: (SQ. FT) 3,801 # FLOORS 1

SLAB PERIMETER: (FT) 159

I. AREAS: ([ ] FIELD VERIFIED ELEVATION PLANS)

		NORTH	SOUTH	EAST	WEST	TOTAL
WALLS, GROSS	(SQ. FT)	0	1,530	666	666	2,862
GLASS	(SQ. FT)	0	127	35	28	190
PERSONNEL DOOR	(SQ. FT)	0	42	21	42	105
OVERHEAD DOOR	(SQ. FT)	0	0	0	0	0
WALLS, NET	(SQ. FT)	0	1,361	610	596	2,567
ROOF AREA (OR CEILING AREA IF ATTIC IS UNCONDITIONED)					(SQ. FT)	3,801
OVERHEAD DOOR	(SQ. FT)	0	PERSONNEL DOOR		(SQ. FT)	105
BASEMENT WALLS	(SQ. FT)	0	0	0	0	0

II. CONSTRUCTION: ([ ] FIELD VERIFIED WALL, ROOF, WINDOW, DOOR TYPES)

WALLS: (SKETCH CROSS SECTION OF WALL)	COMPONENTS	R-VALUE
	1. OUTSIDE AIR FILM	0.17
	2. 4" FACE BRICK	0.43
	3. AIR SPACE	0.91
	4. 6" CMU	1.89
	5.	
	6.	
	7. INSIDE AIR FILM	0.68
	TOTAL R-WALL =	4.08
	U = 1/R	0.245

ROOF: (SKETCH CROSS SECTION OF ROOF)	COMPONENTS	R-VALUE
	1. OUTSIDE AIR FILM	0.17
	2. BUILT UP ROOF	0.34
	3. 1.5" INSULATION	6.00
	4. CEILING AIR SPACE	1.00
	5. 6" FG BATT INSUL	19.00
	6. PLASTER CEILING	1.25
	7. INSIDE AIR FILM	0.68
	TOTAL R-ROOF =	28.44
	U = 1/R	0.035

GLASS TYPE:	PPG 'PENNVERNON' C.L. TWNDV, SSA, .88 S.C.	R-GLASS	1.61
SLAB TYPE FLOOR:	CEMENT	SLF	0.83
BASEMENT TYPE:	NONE	R-BASEM.	0.00
OVERHEAD DOOR TYPE:	NONE	R-ODOOR	0.00
PERSONNEL DOOR TYPE:	METAL	R-PDOOR	2.56

III. INFILTRATION:

TIGHT WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
AVG. WALL H/M/L (SQ.FT.)	M	2862	X CFM / SQ.FT.	0.115	=	329
LEAKY WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
DOOR OPENINGS / HR - SINGLE DOOR			X CFM / OPENING / H	1.600	=	0
DOOR OPENINGS / HR - DOUBLE DOORS		20	X CFM / OPENING / H	1.385	=	28
			TOTAL INFILTRATION (CFM)		=	357

UA ODOOR	ODOOR AREA	0	X DOOR "U"	0.000	=	0
UA PDOOR	PDOOR AREA	105	X DOOR "U"	0.391	=	41
UA WALL	WALL AREA	2,567	X WALL "U"	0.245	=	629
UA ROOF	ROOF AREA	3,801	X ROOF "U"	0.035	=	134
UA GLASS	GLASS AREA	190	X GLASS "U"	0.621	=	118
UA SLAB	SLAB PERIM.	159	X SLF	0.830	=	132
UA BASEM.	B-WALL AREA	0	X BASE. "U"	0.000	=	0
INFILTRATION	CFM	357	X A. T. F.	1.035	=	369
			TOTAL UA (BTU/HR°F)			1,423

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT LEONARD WOOD, MO.

DATE: Feb-96
BY: DMS
JOB: 1406.011
CHK: AJN
FILE: 630Z2BHL

BUILDING HEATING LOAD CALCULATION SHEET

BLDG NO: 630 BLDG NAME: MESS HALL - ZONE 2
BLDG FUNCTION: DINING AREA
FLOOR AREA: (SQ. FT) 7,190 # FLOORS 1
SLAB PERIMETER: (FT) 257

I. AREAS: ([ ] FIELD VERIFIED ELEVATION PLANS)

		NORTH	SOUTH	EAST	WEST	TOTAL
WALLS, GROSS	(SQ. FT)	1,530	0	1,678	1,678	4,886
GLASS	(SQ. FT)	84	0	128	144	356
PERSONNEL DOOR	(SQ. FT)	0	0	63	63	126
INSULATED PANEL	(SQ. FT)	0	0	400	400	800
WALLS, NET	(SQ. FT)	1,446	0	1,087	1,071	3,604
ROOF AREA (OR CEILING AREA IF ATTIC IS UNCONDITIONED)					(SQ. FT)	7,190
INSULATED PANEL	(SQ. FT)	800	PERSONNEL DOOR		(SQ. FT)	126
BASEMENT WALLS	(SQ. FT)	0	0	0	0	0

II. CONSTRUCTION: ([ ] FIELD VERIFIED WALL, ROOF, WINDOW, DOOR TYPES)

WALLS: (SKETCH CROSS SECTION OF WALL)

	COMPONENTS	R-VALUE
1.	OUTSIDE AIR FILM	0.17
2.	4" FACE BRICK	0.43
3.	AIR SPACE	0.91
4.	6" CMU	1.89
5.		
6.		
7.	INSIDE AIR FILM	0.68
	TOTAL R-WALL =	4.08
	U=1/R	0.245

ROOF: (SKETCH CROSS SECTION OF ROOF)

	COMPONENTS	R-VALUE
1.	OUTSIDE AIR FILM	0.17
2.	BUILT UP ROOF	0.34
3.	1.5" INSULATION	6.00
4.	CEILING AIR SPACE	1.00
5.	6" FG BATT INSUL	19.00
6.	PLASTER CEILING	1.25
7.	INSIDE AIR FILM	0.68
	TOTAL R-ROOF =	28.44
	U=1/R	0.035

GLASS TYPE:	PPG 'PENNVERNON' C.L. TWNDV, SSA, .88 S.C.	R-GLASS	1.61
SLAB TYPE FLOOR:	CEMENT	SLF	0.83
BASEMENT TYPE:	NONE	R-BASEM.	0.00
INSULATED PANEL:		R-PANEL	4.20
PERSONNEL DOOR TYPE:	METAL	R-PDOOR	2.56

III. INFILTRATION:

TIGHT WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
AVG. WALL H/M/L (SQ.FT.)	M	4886	X CFM / SQ.FT.	0.115	=	562
LEAKY WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
DOOR OPENINGS / HR - SINGLE DOOR			X CFM /OPENING /HR	1.600	=	0
DOOR OPENINGS / HR - DOUBLE DOORS		100	X CFM /OPENING /HR	1.385	=	139
			TOTAL INFILTRATION (CFM)		=	700

UA PANEL	PANEL AREA	800	X PANEL "U"	0.238	= 190
UA PDOOR	PDOOR AREA	126	X DOOR "U"	0.391	= 49
UA WALL	WALL AREA	2,804	X WALL "U"	0.245	= 883
UA ROOF	ROOF AREA	7,190	X ROOF "U"	0.035	= 253
UA GLASS	GLASS AREA	356	X GLASS "U"	0.621	= 221
UA SLAB	SLAB PERIM.	257	X SLF	0.830	= 213
UA BASEM.	B-WALL AREA	0	X BASE. "U"	0.000	= 0
INFILTRATION	CFM	700	X A. T. F.	1.035	= 725
			TOTAL UA (BTU/HR°F)		2,535

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 630Z1.XLS
BLDG: **630** ZONE: **1**

Rates of Heat Gain from Occupants of Conditioned Spaces

Zone No.	No. of People	Activ. Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)
1	20	5	Standing, light work, or walking slowly	Retail store, bank	270	220	5,400	4,400
TOTAL	20					**TOTAL**	5,400	4,400

Peak Wattage Value for Lights

Zone No.	No. of Fixtures	Fixture Type	Description	Watts/ Fixture	Total Wattage
1	23	8	Fluorescent, 4 - 34w lamps, 2 - 16w ballasts (2x4 ft. fix.)	168	3,864
	16	6	Fluorescent, 2 - 34w lamps, 16w ballast (2x4 ft. fixture)	84	1,344
			0	0	0
TOTAL	39			**TOTAL**	5,208

Peak Value for Internal Gains

Zone No.	No. of Equip.	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattage	Total (BTU)
1	3	89	Refrigerator (large), per 100 cu.ft. of space	220	40%	660	2,253
	6	99	Range (burners), per 2 burner section	2,101	0%	12,606	43,024
	4	95	Fryer (deep fat), per lb. of fat capacity	372	0%	1,488	5,079
	2	83	Freezer (large)	1,340	40%	2,680	9,147
	1	115	Steam Kettle, per quart capacity	146	13%	146	498
	5	88	Mixer (large), per quart of capacity	28	100%	140	478
	2	97	Oven (large convection), per cu.ft. of oven space	1,304	0%	1,304	1,535
	1	73	Blender,per quart of capacity	454	98%	454	1,550
	2	114	Dishwasher (conveyor water sanitizing), per 100 dish/hr.	346	44%	692	2,362
	2	87	Microwave oven (Heavy duty commercial)	2,628	100%	2,628	1,535
				TOTAL	21%	22,798	67,460

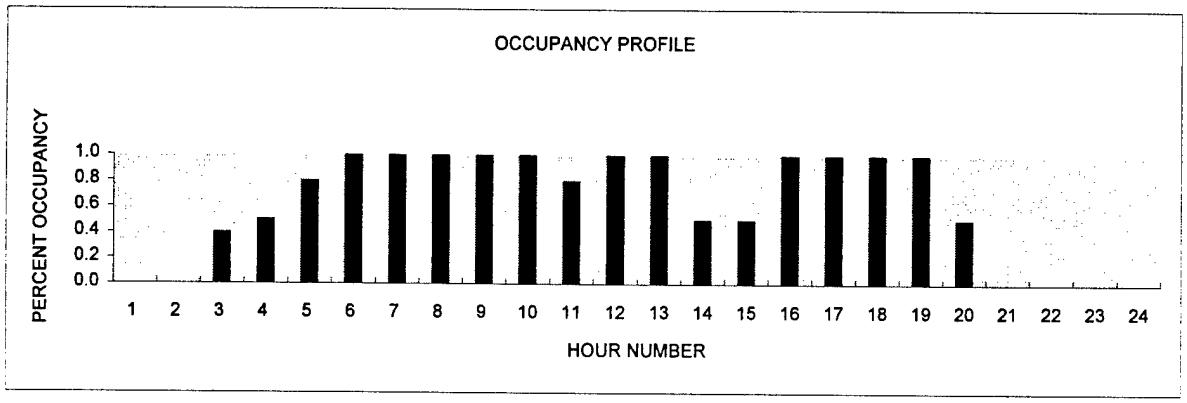
V:\1406.011\COLECTD\FIELD\PLE\630Z1.XLS

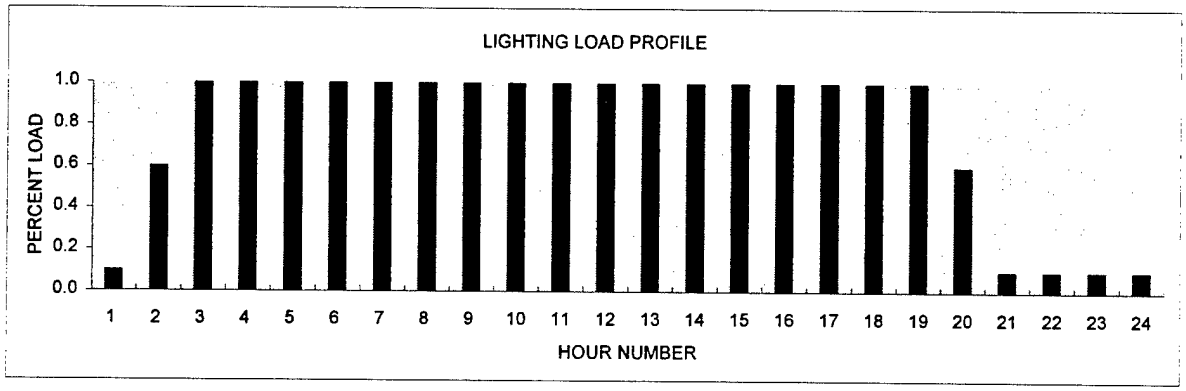
EMC Engineers, Inc.

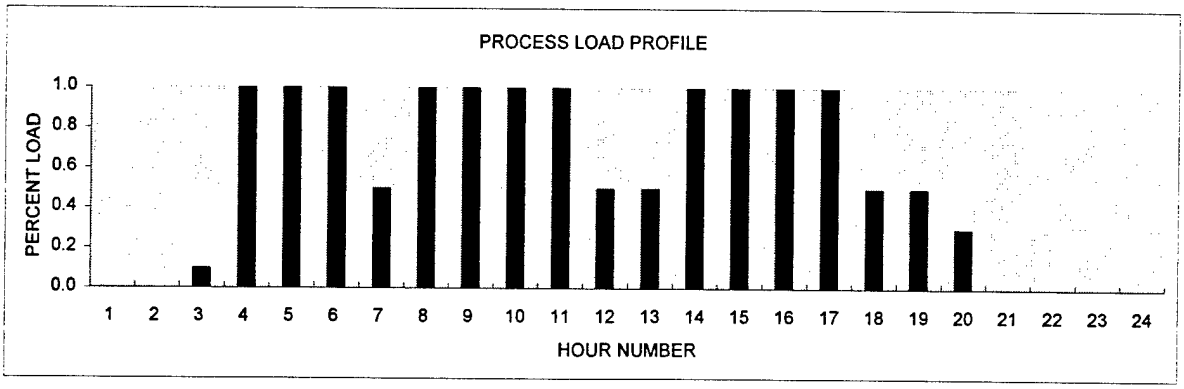
PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 630Z1.XLS
BLDG: 630
ZONE: 1

BLDG TYPE	BLDG FUNCTION	TYPE OF PROFILE	HOUR NUMBER																							
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
3	Administration	OCCUPANCY	0.0	0.0	0.4	0.5	0.8	1.0	1.0	1.0	1.0	1.0	0.8	1.0	1.0	0.5	0.5	1.0	1.0	1.0	1.0	0.5	0.0	0.0	0.0	0.0
		LIGHTING	0.1	0.6	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.6	0.1	0.1	0.1	0.1
		PROCESS	0.0	0.0	0.1	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	0.5	0.5	1.0	1.0	1.0	1.0	0.5	0.5	0.3	0.0	0.0	0.0	0.0







V:\1406.011\COLECTD\FIELD\PLE\630Z1.XLS

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE:
BLDG: 630 ZONE: 2

Rates of Heat Gain from Occupants of Conditioned Spaces

Zone No.	No. of People	Activ. Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)
2	240	3	Seated Eating	Restaurant	225	325	54,000	78,000
	10	5	Standing, light work, or walking slowly	Retail store, bank	270	220	2,700	2,200
TOTAL	250					TOTAL	56,700	80,200

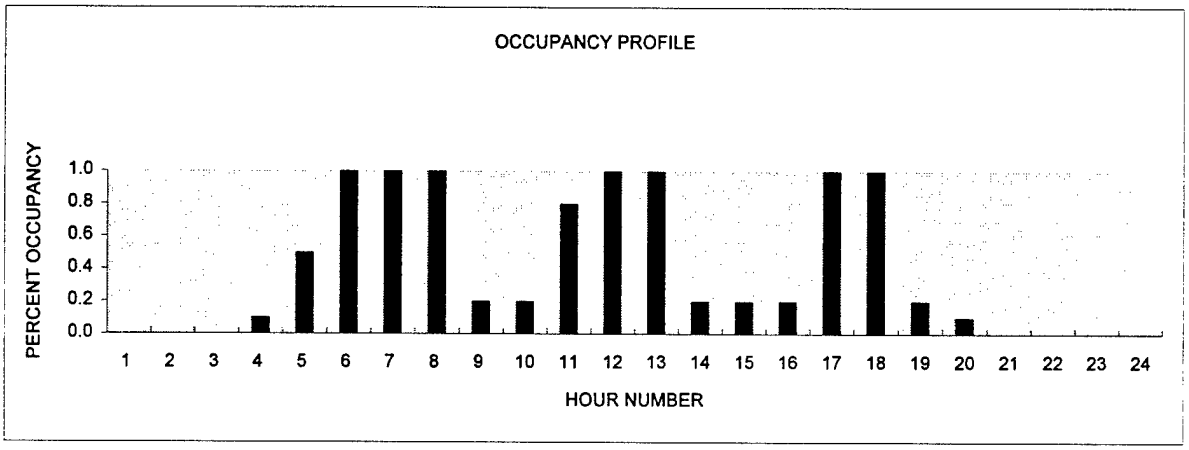
Peak Wattage Value for Lights

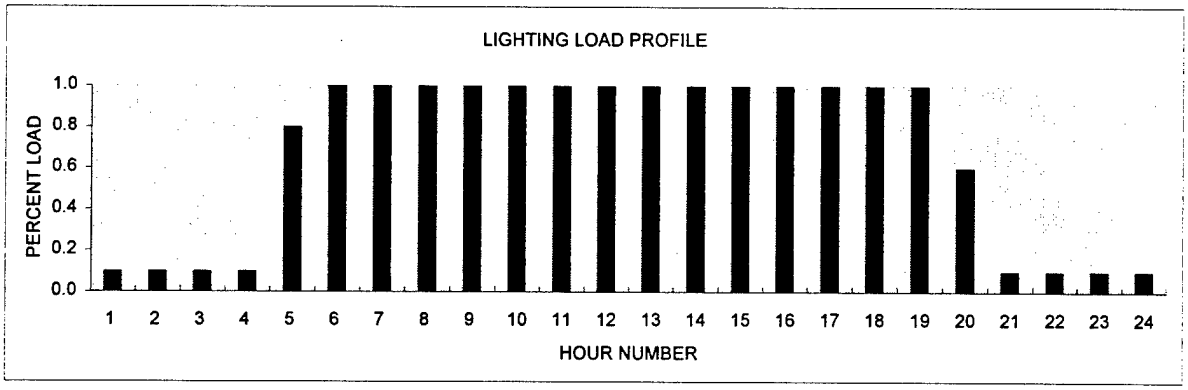
Zone No.	No. of Fixtures	Fixture Type	Description	Watts/ Fixture	Total Wattage
2	32	18	Incandescent - 60w	60	1,920
	68	6	Fluorescent, 2 - 34w lamps, 16w ballast (2x4 ft. fixture)	84	5,712
TOTAL	100			TOTAL	7,632

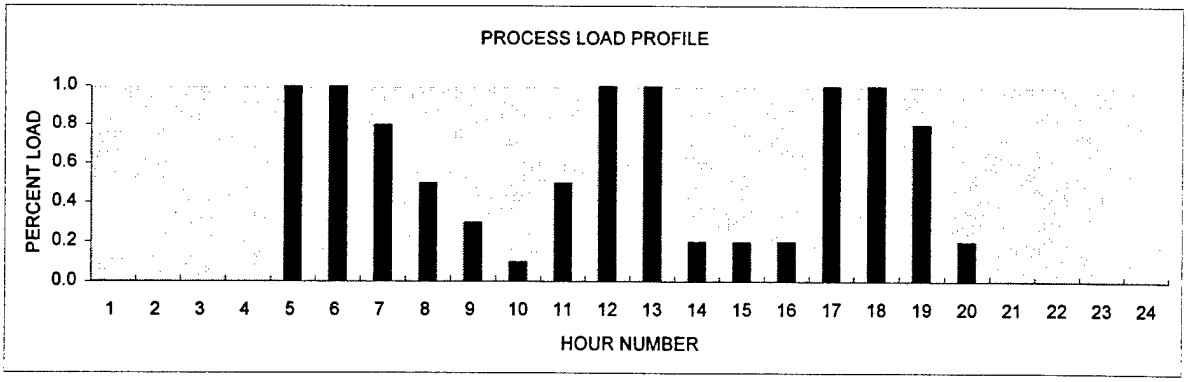
Peak Value for Internal Gains

Zone No.	No. of Equip.	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattage	Total (BTU)
2	2	89	Refrigerator (large), per 100 cu.ft. of space	220	40%	440	1,502
	2	99	Range (burners), per 2 burner section	2,101	0%	4,202	14,341
	2	95	Fryer (deep fat), per lb. of fat capacity	372	0%	744	2,539
	2	83	Freezer (large)	1,340	40%	2,680	9,147
	4	115	Steam Kettle, per quart capacity	146	13%	584	1,993
	2	88	Mixer (large), per quart of capacity	28	100%	56	191
	4	97	Oven (large convection), per cu.ft. of oven space	1,304	0%	1,304	4,451
	1	71	Water Heater	2,475	30%	2,475	8,447
	2	20	Carving Knife	92	5%	184	628
	1	28	Dishwasher	1,201	100%	1,201	4,099
	2	77	Coffee brewing Urn (large), per quart capacity	624	105%	1,248	4,259
	2	86	Ice maker	1,089	251%	2,178	7,434
	2	103	Griddle/grill (large), per sq.ft. of cooking surface	4,981	10%	4,981	17,000
	4	63	Toaster	1,146	100%	1,146	3,911
				TOTAL	50%	23,423	79,943

BLDG TYPE	BLDG FUNCTION	TYPE OF PROFILE	HOUR NUMBER																							
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
3	Administration	OCCUPANCY	0.0	0.0	0.0	0.1	0.5	1.0	1.0	1.0	0.2	0.2	0.8	1.0	1.0	0.2	0.2	0.2	1.0	1.0	0.2	0.1	0.0	0.0	0.0	0.0
		LIGHTING	0.1	0.1	0.1	0.1	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.6	0.1	0.1	0.1	0.1
		PROCESS	0.0	0.0	0.0	0.0	1.0	1.0	0.8	0.5	0.3	0.1	0.5	1.0	1.0	0.2	0.2	0.2	1.0	1.0	0.8	0.2	0.0	0.0	0.0	0.0







BLDG 630 - MESS HALL KITCHEN AREA - ZONE 1 BASELINE

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 0

ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0

WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000

LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1

SKY CLEARNESS FACTOR (CLN) 1.000000

NUMBER OF ZONES (NZ) 1

WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1

WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******

FILE NAME MO

STATION 13995 YEAR 1955

SITE LATITUDE DEG (AL1) 37.750000

ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000

MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000

AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000

SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01

SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01

SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01

INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000

INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000

INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03

INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00

VOLUME OF ZONE IN CUBIC FEET (VOLHS) 40515.000000

FLOOR AREA (SQFT) 3801.000000

HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 1128650.000000

COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00

COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 76020.000000

CONSTANT INFILTRATION RATE CFM (CFMI) 357.000000

INFILTRATION PROFILE

1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

A FACTOR IN INFILTRATION EQUATION (CINA) 5.290000E-01

B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02

C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03

BUILDING THERMAL MASS MCP BTU/F (CMCP) 24800.000000

BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00

SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 159.000000

PARTITION UA BTU/HR-F (GUA) 0.000000E+00

DOOR UA BTU/HR-F (DUA) 41.000000

WINDOW GLASS NUMBER (NG) 30

DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01

NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01

WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1361.0	596.0	.0	610.0
WINDOW AREA SQFT (AWND)	127.0	28.0	.0	35.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	12.7	2.8	.0	3.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.245	.245	.245
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01837	.01837	.01837	.01837
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00003	.00003	.00003	.00003
N=2	.00283	.00283	.00283	.00283
N=3	.01017	.01017	.01017	.01017
N=4	.00498	.00498	.00498	.00498
N=5	.00037	.00037	.00037	.00037
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	-.07415	-.07415	-.07415	-.07415
N=5	.00212	.00212	.00212	.00212
N=6	********	********	********	********

ROOF AREA SQFT (AROF) 3801.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.500000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.696739E-02
ROOF B TRANSFER FUNCTIONS (BNR)
.951E-03 .982E-02 .593E-02 .266E-03 380. 380.
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -.600 .822E-01 -.300E-03 999. 999.
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 2.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	5.	14167.	5400.	4400.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	60.0	.0
2	.600	.000	.000	.000	60.0	.0
3	1.000	.100	.400	.400	60.0	.0
4	1.000	1.000	.500	.500	60.0	.0
5	1.000	1.000	.800	.800	60.0	.0
6	1.000	1.000	1.000	1.000	60.0	.0
7	1.000	.500	1.000	1.000	60.0	.0
8	1.000	1.000	1.000	1.000	60.0	.0

```
   9        1.000     1.000     1.000     1.000        60.0         .0
  10        1.000     1.000     1.000     1.000        60.0         .0
  11        1.000     1.000      .800      .800        60.0         .0
  12        1.000      .500     1.000     1.000        60.0         .0
  13        1.000      .500     1.000     1.000        60.0         .0
  14        1.000     1.000      .500      .500        60.0         .0
  15        1.000     1.000      .500      .500        60.0         .0
  16        1.000     1.000     1.000     1.000        60.0         .0
  17        1.000     1.000     1.000     1.000        60.0         .0
  18        1.000      .500     1.000     1.000        60.0         .0
  19        1.000      .500     1.000     1.000        60.0         .0
  20         .600      .300      .500      .500        60.0         .0
  21         .100      .000      .000      .000        60.0         .0
  22         .100      .000      .000      .000        60.0         .0
  23         .100      .000      .000      .000        60.0         .0
  24         .100      .000      .000      .000        60.0         .0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)      60.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)     100.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)   16500.000000
ECONOMIZER HIGH TEMP LIMIT F      100.000000
SYSTEM SUPPLY AIR START TIME HR        1.000000
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)      65.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)        1.000000
FAN EFFICIENCY (EFAN)    5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)         1.000000
HEATING PLANT RATED OUTPUT BTU (HFLOT) 1128650.000000
HEATING PLANT RATED INPUT BTU (HFLIN)  1410813.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)           4
COOLING PLANT RATED OUTPUT BTU (CFLOT)    1.000000E-10
COOLING PLANT RATED INPUT BTU (CFLIN)    0.000000E+00
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 630 - MESS HALL KITCHEN AREA - ZONE 1 BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	3.	0.	0.	0.	0.	0.	0.	0.
	-247.	LOSS		-3.	-4.	0.	-8.	-2.	-261.	0.
FEB	0.	GAIN	4.	0.	0.	0.	1.	0.	0.	0.
	-203.	LOSS		-2.	-3.	0.	-6.	-2.	-219.	0.
MAR	0.	GAIN	5.	0.	0.	0.	1.	0.	0.	0.
	-179.	LOSS		-2.	-3.	0.	-5.	-1.	-201.	0.
APR	.00	GAIN	4.44	.22	.01	.00	2.95	.01	1.17	.00
	-61.07	LOSS		-1.24	-1.64	.00	-2.01	-.82	-88.75	.00
MAY	.00	GAIN	4.72	.33	.02	.00	4.06	.01	1.60	.00
	-15.17	LOSS		-.82	-1.04	.00	-.82	-.50	-48.10	.00
JUN	.00	GAIN	4.79	.37	.02	.00	4.22	.01	1.39	.00
	-.10	LOSS		-.73	-.95	.00	-.69	-.46	-31.82	.00
JUL	.00	GAIN	4.88	.40	.02	.00	4.24	.01	1.72	.00
	-.01	LOSS		-.78	-.99	.00	-.82	-.49	-33.91	.00
AUG	.00	GAIN	4.28	.35	.02	.00	4.06	.01	1.50	.00
	.00	LOSS		-.74	-.88	.00	-.63	-.43	-33.31	.00
SEP	.00	GAIN	4.01	.21	.03	.00	3.20	.01	1.91	.00
	-12.84	LOSS		-.96	-1.11	.00	-1.04	-.55	-42.66	.00
OCT	.00	GAIN	3.67	.09	.01	.00	2.16	.01	1.04	.00
	-56.70	LOSS		-1.30	-1.46	.00	-2.03	-.71	-84.18	.00
NOV	0.	GAIN	3.	0.	0.	0.	1.	0.	0.	0.
	-128.	LOSS		-2.	-2.	0.	-4.	-1.	-149.	0.
DEC	0.	GAIN	3.	0.	0.	0.	0.	0.	0.	0.
	-275.	LOSS		-3.	-4.	0.	-8.	-2.	-287.	0.
TOT	0.	GAIN	48.	2.	0.	0.	28.	0.	11.	0.
	-1178.	LOSS		-19.	-24.	0.	-39.	-12.	-1479.	0.

MAX HEATING LOAD= -1128650. BTUH ON DEC 18 HOUR 9 AMBIENT TEMP 3.
MAX COOLING LOAD= 0. BTUH ON DEC 31 HOUR 24 AMBIENT TEMP 42.

ZONE UA BTU/HR-F 920.8

BLDG 630 - MESS HALL KITCHEN AREA - ZONE 1 BASELINE

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	60.	67.		4	14	64.	3.02	29.07	8.55	27.47
			59.	29	2	9.				
FEB	61.	73.		17	17	50.	2.73	26.26	7.14	24.23
			59.	2	1	16.				
MAR	63.	82.		11	19	61.	3.02	29.07	7.21	26.13
			59.	14	1	23.				
APR	67.	90.		7	19	65.	2.92	28.13	6.41	24.72
			60.	11	1	34.				
MAY	72.	99.		27	19	76.	3.02	29.07	6.67	25.59
			60.	11	1	39.				
JUN	79.	101.		30	19	82.	2.92	28.13	6.06	24.37
			60.	19	2	57.				
JUL	84.	111.		15	19	87.	3.02	29.07	6.35	25.27
			60.	10	5	57.				
AUG	82.	106.		12	19	84.	3.02	29.07	6.63	25.55
			61.	24	24	59.				
SEP	76.	106.		2	19	83.	2.92	28.13	5.83	24.14
			60.	26	1	45.				
OCT	67.	88.		1	15	85.	3.02	29.07	6.85	25.77
			60.	11	1	36.				
NOV	63.	80.		17	19	59.	2.92	28.13	7.00	25.30
			59.	2	24	20.				
DEC	61.	75.		23	19	54.	3.02	29.07	7.07	25.99
			52.	18	7	-1.				
YEAR							35.55	342.26	81.75	304.52

BLDG 630 - MESS HALL KITCHEN AREA - ZONE 1 BASELINE

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	674	0	0	0	-.1076E+07	.0000
FEB	564	0	0	0	-.9507E+06	.0000
MAR	542	0	0	0	-.8501E+06	.0000
APR	282	0	0	0	-.5785E+06	.0000
MAY	123	0	0	0	-.3999E+06	.0000
JUN	6	0	0	0	-.4719E+05	.0000
JUL	2	0	0	0	-8482.	.0000
AUG	0	0	0	0	.0000	.0000
SEP	112	0	0	0	-.2707E+06	.0000
OCT	331	0	0	0	-.4979E+06	.0000
NOV	436	0	0	0	-.8093E+06	.0000
DEC	584	0	12	0	-.1129E+07	.0000
YEAR	3656	0	12	0	-.1129E+07	.0000

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	381.93	.00	3.02	29.07	2.50	27.47	8.7
FEB	315.42	.00	2.73	26.26	2.09	24.23	8.7
MAR	282.17	.00	3.02	29.07	2.11	26.13	8.7
APR	113.45	.00	2.92	28.13	1.88	24.72	8.7
MAY	39.57	.00	3.02	29.07	1.95	25.59	8.7
JUN	1.61	.00	2.92	28.13	1.77	24.37	8.7
JUL	.54	.00	3.02	29.07	1.86	25.27	8.7
AUG	.00	.00	3.02	29.07	1.94	25.55	8.7
SEP	33.45	.00	2.92	28.13	1.71	24.14	8.7
OCT	118.29	.00	3.02	29.07	2.01	25.77	8.7
NOV	211.22	.00	2.92	28.13	2.05	25.30	8.7
DEC	390.66	.00	3.02	29.07	2.07	25.99	8.7
YEAR	1888.31	.00	35.55	342.26	23.95	304.52	8.7

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 640264. BTU/(SQFT-YEAR)

BLDG 630 - MESS HALL KITCHEN AREA - ZONE 1 BASELINE

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.1076E+07
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.9507E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.0000	-.8501E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.0000	-.5785E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.0000	-.3999E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	-.4719E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	-8482.
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	-.2707E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.0000	-.4979E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.0000	-.8093E+06
DEC	883.	604.	1.000	35.	0.	0.	0	12	.0000	-.1129E+07

BLDG 630 - MESS HALL KITCHEN AREA - ZN 1 ECO-1 INSTALL FIBERGLASS INSUL.

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 0
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 40515.000000
FLOOR AREA (SQFT) 3801.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 1128650.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 76020.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 357.000000
INFILTRATION PROFILE

1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

A FACTOR IN INFILTRATION EQUATION (CINA) 5.290000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 24800.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 159.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 41.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1361.0	596.0	.0	610.0
WINDOW AREA SQFT (AWND)	127.0	28.0	.0	35.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	12.7	2.8	.0	3.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.064	.064	.064	.064
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00176	.00176	.00176	.00176
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00016	.00016	.00016	.00016
N=3	.00086	.00086	.00086	.00086
N=4	.00066	.00066	.00066	.00066
N=5	.00008	.00008	.00008	.00008
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	-.16643	-.16643	-.16643	-.16643
N=5	.00728	.00728	.00728	.00728
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 3801.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.500000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.696739E-02
ROOF B TRANSFER FUNCTIONS (BNR)
.951E-03 .982E-02 .593E-02 .266E-03 380. 380.
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -.600 .822E-01 -.300E-03 999. 999.
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 2.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	5.	14167.	5400.	4400.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	60.0	.0
2	.600	.000	.000	.000	60.0	.0
3	1.000	.100	.400	.400	60.0	.0
4	1.000	1.000	.500	.500	60.0	.0
5	1.000	1.000	.800	.800	60.0	.0
6	1.000	1.000	1.000	1.000	60.0	.0
7	1.000	.500	1.000	1.000	60.0	.0
8	1.000	1.000	1.000	1.000	60.0	.0

```
  9        1.000     1.000     1.000     1.000        60.0         .0
 10        1.000     1.000     1.000     1.000        60.0         .0
 11        1.000     1.000      .800      .800        60.0         .0
 12        1.000      .500     1.000     1.000        60.0         .0
 13        1.000      .500     1.000     1.000        60.0         .0
 14        1.000     1.000      .500      .500        60.0         .0
 15        1.000     1.000      .500      .500        60.0         .0
 16        1.000     1.000     1.000     1.000        60.0         .0
 17        1.000     1.000     1.000     1.000        60.0         .0
 18        1.000      .500     1.000     1.000        60.0         .0
 19        1.000      .500     1.000     1.000        60.0         .0
 20         .600      .300      .500      .500        60.0         .0
 21         .100      .000      .000      .000        60.0         .0
 22         .100      .000      .000      .000        60.0         .0
 23         .100      .000      .000      .000        60.0         .0
 24         .100      .000      .000      .000        60.0         .0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       60.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)      100.000000
SYSTEM TYPE, (IECN)            2
SUPPLY AIR CFM (SACFM)    16500.000000
ECONOMIZER HIGH TEMP LIMIT F       100.000000
SYSTEM SUPPLY AIR START TIME HR         1.000000
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       65.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)         1.000000
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)          1.000000
HEATING PLANT RATED OUTPUT BTU (HFLOT) 1128650.000000
HEATING PLANT RATED INPUT BTU (HFLIN)  1410813.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906      1.00      1.00
CHILLER TYPE (ITYPCH)             4
COOLING PLANT RATED OUTPUT BTU (CFLOT)     1.000000E-10
COOLING PLANT RATED INPUT BTU (CFLIN)     0.000000E+00
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BEACON Energy Analysis By EMC Engineers, Inc. 630AFG.I

BLDG 630 - MESS HALL KITCHEN AREA - ZN 1 ECO-1 INSTALL FIBERGLASS INSUL.

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	3.	0.	0.	0.	0.	0.	0.	0.
	-241.	LOSS		-3.	-4.	0.	-2.	-2.	-262.	0.
FEB	0.	GAIN	4.	0.	0.	0.	0.	0.	0.	0.
	-199.	LOSS		-2.	-3.	0.	-1.	-2.	-219.	0.
MAR	0.	GAIN	5.	0.	0.	0.	0.	0.	0.	0.
	-177.	LOSS		-2.	-3.	0.	-1.	-1.	-201.	0.
APR	.00	GAIN	4.44	.22	.01	.00	.58	.01	1.13	.00
	-60.58	LOSS		-1.24	-1.64	.00	-.37	-.82	-87.42	.00
MAY	.00	GAIN	4.72	.33	.02	.00	.93	.01	1.55	.00
	-15.39	LOSS		-.80	-1.00	.00	-.06	-.48	-45.98	.00
JUN	.00	GAIN	4.79	.37	.02	.00	1.03	.01	1.35	.00
	-.12	LOSS		-.70	-.91	.00	-.07	-.44	-29.35	.00
JUL	.00	GAIN	4.88	.41	.02	.00	1.01	.01	1.72	.00
	-.02	LOSS		-.76	-.95	.00	-.09	-.47	-31.47	.00
AUG	.00	GAIN	4.28	.36	.02	.00	.98	.01	1.47	.00
	.00	LOSS		-.71	-.84	.00	-.05	-.41	-30.85	.00
SEP	.00	GAIN	4.01	.20	.03	.00	.71	.01	1.83	.00
	-13.05	LOSS		-.94	-1.09	.00	-.09	-.54	-41.20	.00
OCT	.00	GAIN	3.67	.09	.01	.00	.35	.01	.98	.00
	-56.20	LOSS		-1.30	-1.47	.00	-.35	-.72	-83.49	.00
NOV	0.	GAIN	3.	0.	0.	0.	0.	0.	0.	0.
	-126.	LOSS		-2.	-2.	0.	-1.	-1.	-149.	0.
DEC	0.	GAIN	3.	0.	0.	0.	0.	0.	0.	0.
	-270.	LOSS		-3.	-4.	0.	-2.	-2.	-287.	0.
TOT	0.	GAIN	48.	2.	0.	0.	6.	0.	11.	0.
	-1159.	LOSS		-19.	-24.	0.	-9.	-12.	-1467.	0.

MAX HEATING LOAD= -1128650. BTUH ON DEC 18 HOUR 9 AMBIENT TEMP 3.
MAX COOLING LOAD= 0. BTUH ON DEC 31 HOUR 24 AMBIENT TEMP 42.

ZONE UA BTU/HR-F 456.1

BLDG 630 - MESS HALL KITCHEN AREA - ZN 1 ECO-1 INSTALL FIBERGLASS INSUL.

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	60.	67.		4	14	64.	3.02	29.07	8.37	27.29
			59.	26	24	12.				
FEB	61.	73.		17	17	50.	2.73	26.26	7.00	24.08
			59.	2	1	16.				
MAR	63.	83.		11	17	64.	3.02	29.07	7.13	26.05
			60.	15	1	22.				
APR	67.	89.		29	19	69.	2.92	28.13	6.35	24.66
			60.	11	1	34.				
MAY	72.	99.		27	19	76.	3.02	29.07	6.67	25.59
			60.	11	1	39.				
JUN	79.	101.		24	18	78.	2.92	28.13	6.06	24.37
			60.	19	2	57.				
JUL	84.	110.		15	18	92.	3.02	29.07	6.35	25.27
			60.	10	5	57.				
AUG	82.	106.		12	19	84.	3.02	29.07	6.63	25.55
			61.	25	1	58.				
SEP	76.	106.		2	17	87.	2.92	28.13	5.83	24.14
			60.	26	1	45.				
OCT	67.	88.		7	16	65.	3.02	29.07	6.79	25.71
			60.	10	24	34.				
NOV	63.	80.		25	17	58.	2.92	28.13	6.86	25.17
			60.	2	24	20.				
DEC	61.	76.		23	18	55.	3.02	29.07	6.84	25.76
			53.	18	7	-1.				
YEAR							35.55	342.26	80.86	303.63

BLDG 630 - MESS HALL KITCHEN AREA - ZN 1 ECO-1 INSTALL FIBERGLASS INSUL.

	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED		NUMBER OF HOURS WHEN LOADS WERE NOT MET		MAXIMUM LOADS BTU	
MONTH	HEATING	COOLING INCLUDING ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	659	0	0	0	-.1058E+07	.0000
FEB	552	0	0	0	-.9316E+06	.0000
MAR	534	0	0	0	-.8345E+06	.0000
APR	278	0	0	0	-.5702E+06	.0000
MAY	125	0	0	0	-.3964E+06	.0000
JUN	5	0	0	0	-.4144E+05	.0000
JUL	2	0	0	0	-.1076E+05	.0000
AUG	0	0	0	0	.0000	.0000
SEP	114	0	0	0	-.2729E+06	.0000
OCT	322	0	0	0	-.4946E+06	.0000
NOV	424	0	0	0	-.8000E+06	.0000
DEC	565	0	12	0	-.1129E+07	.0000
YEAR	3580	0	12	0	-.1129E+07	.0000

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	372.91	.00	3.02	29.07	2.45	27.29	8.7
FEB	306.05	.00	2.73	26.26	2.05	24.08	8.7
MAR	278.04	.00	3.02	29.07	2.09	26.05	8.7
APR	111.90	.00	2.92	28.13	1.86	24.66	8.7
MAY	40.22	.00	3.02	29.07	1.95	25.59	8.7
JUN	1.34	.00	2.92	28.13	1.77	24.37	8.7
JUL	.54	.00	3.02	29.07	1.86	25.27	8.7
AUG	.00	.00	3.02	29.07	1.94	25.55	8.7
SEP	34.01	.00	2.92	28.13	1.71	24.14	8.7
OCT	116.49	.00	3.02	29.07	1.99	25.71	8.7
NOV	205.42	.00	2.92	28.13	2.01	25.17	8.7
DEC	381.88	.00	3.02	29.07	2.00	25.76	8.7
YEAR	1848.80	.00	35.55	342.26	23.69	303.63	8.7

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 629635. BTU/(SQFT-YEAR)

BLDG 630 - MESS HALL KITCHEN AREA - ZN 1 ECO-1 INSTALL FIBERGLASS INSUL.

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.1058E+07
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.9316E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.0000	-.8345E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.0000	-.5702E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.0000	-.3964E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	-.4144E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	-.1076E+05
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	-.2729E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.0000	-.4946E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.0000	-.8000E+06
DEC	883.	604.	1.000	35.	0.	0.	0	12	.0000	-.1129E+07

BLDG 630 - MESS HALL KITCHEN AREA - ZN 1 ECO-2 INSTALL RIGID INSULATION

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 0
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 40515.000000
FLOOR AREA (SQFT) 3801.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 1128650.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 76020.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 357.000000
INFILTRATION PROFILE

1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

A FACTOR IN INFILTRATION EQUATION (CINA) 5.290000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 24800.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 159.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 41.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1361.0	596.0	.0	610.0
WINDOW AREA SQFT (AWND)	127.0	28.0	.0	35.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	12.7	2.8	.0	3.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.055	.055	.055	.055
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00174	.00174	.00174	.00174
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00019	.00019	.00019	.00019
N=3	.00089	.00089	.00089	.00089
N=4	.00059	.00059	.00059	.00059
N=5	.00007	.00007	.00007	.00007
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	-.14508	-.14508	-.14508	-.14508
N=5	.00613	.00613	.00613	.00613
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 3801.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.500000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.696739E-02
ROOF B TRANSFER FUNCTIONS (BNR)
.951E-03 .982E-02 .593E-02 .266E-03 380. 380.
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -.600 .822E-01 -.300E-03 999. 999.
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 2.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	5.	14167.	5400.	4400.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	60.0	.0
2	.600	.000	.000	.000	60.0	.0
3	1.000	.100	.400	.400	60.0	.0
4	1.000	1.000	.500	.500	60.0	.0
5	1.000	1.000	.800	.800	60.0	.0
6	1.000	1.000	1.000	1.000	60.0	.0
7	1.000	.500	1.000	1.000	60.0	.0
8	1.000	1.000	1.000	1.000	60.0	.0

```
  9        1.000     1.000     1.000     1.000        60.0         .0
 10        1.000     1.000     1.000     1.000        60.0         .0
 11        1.000     1.000      .800      .800        60.0         .0
 12        1.000      .500     1.000     1.000        60.0         .0
 13        1.000      .500     1.000     1.000        60.0         .0
 14        1.000     1.000      .500      .500        60.0         .0
 15        1.000     1.000      .500      .500        60.0         .0
 16        1.000     1.000     1.000     1.000        60.0         .0
 17        1.000     1.000     1.000     1.000        60.0         .0
 18        1.000      .500     1.000     1.000        60.0         .0
 19        1.000      .500     1.000     1.000        60.0         .0
 20         .600      .300      .500      .500        60.0         .0
 21         .100      .000      .000      .000        60.0         .0
 22         .100      .000      .000      .000        60.0         .0
 23         .100      .000      .000      .000        60.0         .0
 24         .100      .000      .000      .000        60.0         .0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       60.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)      100.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)    16500.000000
ECONOMIZER HIGH TEMP LIMIT F       100.000000
SYSTEM SUPPLY AIR START TIME HR         1.000000
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       65.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)         1.000000
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)         1.000000
HEATING PLANT RATED OUTPUT BTU (HFLOT) 1128650.000000
HEATING PLANT RATED INPUT BTU (HFLIN)  1410813.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)            4
COOLING PLANT RATED OUTPUT BTU (CFLOT)     1.000000E-10
COOLING PLANT RATED INPUT BTU (CFLIN)     0.000000E+00
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 630 - MESS HALL KITCHEN AREA - ZN 1 ECO-2 INSTALL RIGID INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	3.	0.	0.	0.	0.	0.	0.	0.
	-241.	LOSS		-3.	-4.	0.	-2.	-2.	-262.	0.
FEB	0.	GAIN	4.	0.	0.	0.	0.	0.	0.	0.
	-199.	LOSS		-2.	-3.	0.	-1.	-2.	-219.	0.
MAR	0.	GAIN	5.	0.	0.	0.	0.	0.	0.	0.
	-177.	LOSS		-2.	-3.	0.	-1.	-1.	-201.	0.
APR	.00	GAIN	4.44	.22	.01	.00	.51	.01	1.13	.00
	-60.57	LOSS		-1.24	-1.64	.00	-.33	-.82	-87.39	.00
MAY	.00	GAIN	4.72	.33	.02	.00	.81	.01	1.55	.00
	-15.42	LOSS		-.80	-1.00	.00	-.06	-.48	-45.90	.00
JUN	.00	GAIN	4.79	.37	.02	.00	.89	.01	1.36	.00
	-.12	LOSS		-.70	-.90	.00	-.07	-.44	-29.24	.00
JUL	.00	GAIN	4.88	.41	.02	.00	.88	.01	1.73	.00
	-.02	LOSS		-.75	-.95	.00	-.08	-.47	-31.37	.00
AUG	.00	GAIN	4.28	.36	.02	.00	.85	.01	1.48	.00
	.00	LOSS		-.71	-.84	.00	-.05	-.41	-30.75	.00
SEP	.00	GAIN	4.01	.20	.03	.00	.62	.01	1.84	.00
	-13.06	LOSS		-.94	-1.09	.00	-.09	-.54	-41.14	.00
OCT	.00	GAIN	3.67	.09	.01	.00	.32	.01	.98	.00
	-56.20	LOSS		-1.30	-1.47	.00	-.31	-.72	-83.48	.00
NOV	0.	GAIN	3.	0.	0.	0.	0.	0.	0.	0.
	-126.	LOSS		-2.	-2.	0.	-1.	-1.	-149.	0.
DEC	0.	GAIN	3.	0.	0.	0.	0.	0.	0.	0.
	-269.	LOSS		-3.	-4.	0.	-2.	-2.	-288.	0.
TOT	0.	GAIN	48.	2.	0.	0.	5.	0.	11.	0.
	-1158.	LOSS		-19.	-24.	0.	-8.	-12.	-1466.	0.

MAX HEATING LOAD= -1128650. BTUH ON DEC 18 HOUR 9 AMBIENT TEMP 3.
MAX COOLING LOAD= 0. BTUH ON DEC 31 HOUR 24 AMBIENT TEMP 42.

ZONE UA BTU/HR-F 433.0

BEACON Energy Analysis By EMC Engineers, Inc. 630ARGD.I

BLDG 630 - MESS HALL KITCHEN AREA - ZN 1 ECO-2 INSTALL RIGID INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	COINCIDENT DAY	HR	AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL INTERNAL HEAT GAIN MILLION BTU
JAN	60.	67.		4	14	64.	3.02	29.07	8.35	27.27
			59.	26	24	12.				
FEB	61.	73.		17	17	50.	2.73	26.26	6.97	24.06
			59.	2	1	16.				
MAR	63.	83.		11	17	64.	3.02	29.07	7.13	26.05
			60.	15	1	22.				
APR	67.	89.		29	19	69.	2.92	28.13	6.35	24.66
			60.	11	1	34.				
MAY	72.	99.		27	19	76.	3.02	29.07	6.67	25.59
			60.	11	1	39.				
JUN	79.	101.		24	18	78.	2.92	28.13	6.06	24.37
			60.	19	2	57.				
JUL	84.	110.		15	18	92.	3.02	29.07	6.35	25.27
			60.	10	5	57.				
AUG	82.	106.		12	19	84.	3.02	29.07	6.63	25.55
			61.	25	1	58.				
SEP	76.	106.		2	17	87.	2.92	28.13	5.83	24.14
			60.	26	1	45.				
OCT	67.	88.		7	16	65.	3.02	29.07	6.79	25.71
			60.	10	24	34.				
NOV	63.	80.		25	17	58.	2.92	28.13	6.86	25.17
			60.	2	24	20.				
DEC	61.	76.		23	18	55.	3.02	29.07	6.83	25.75
			53.	18	7	-1.				
YEAR							35.55	342.26	80.82	303.58

BLDG 630 - MESS HALL KITCHEN AREA - ZN 1 ECO-2 INSTALL RIGID INSULATION

	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED		NUMBER OF HOURS WHEN LOADS WERE NOT MET		MAXIMUM LOADS BTU	
MONTH	HEATING	COOLING INCLUDING ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	658	0	0	0	-.1058E+07	.0000
FEB	550	0	0	0	-.9312E+06	.0000
MAR	534	0	0	0	-.8341E+06	.0000
APR	278	0	0	0	-.5701E+06	.0000
MAY	125	0	0	0	-.3965E+06	.0000
JUN	5	0	0	0	-.4143E+05	.0000
JUL	2	0	0	0	-.1095E+05	.0000
AUG	0	0	0	0	.0000	.0000
SEP	114	0	0	0	-.2731E+06	.0000
OCT	322	0	0	0	-.4945E+06	.0000
NOV	424	0	0	0	-.7996E+06	.0000
DEC	564	0	12	0	-.1129E+07	.0000
YEAR	3576	0	12	0	-.1129E+07	.0000

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
MONTH	HEATING MILLION BTU	COOLING THOUSAND KWH	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FANS THOUSAND KWH	HEAT GAIN MILLION BTU	ELECTRIC DEMAND KW
JAN	371.89	.00	3.02	29.07	2.45	27.27	8.7
FEB	305.90	.00	2.73	26.26	2.04	24.06	8.7
MAR	277.70	.00	3.02	29.07	2.09	26.05	8.7
APR	111.89	.00	2.92	28.13	1.86	24.66	8.7
MAY	40.23	.00	3.02	29.07	1.95	25.59	8.7
JUN	1.34	.00	2.92	28.13	1.77	24.37	8.7
JUL	.54	.00	3.02	29.07	1.86	25.27	8.7
AUG	.00	.00	3.02	29.07	1.94	25.55	8.7
SEP	34.02	.00	2.92	28.13	1.71	24.14	8.7
OCT	116.22	.00	3.02	29.07	1.99	25.71	8.7
NOV	205.34	.00	2.92	28.13	2.01	25.17	8.7
DEC	381.64	.00	3.02	29.07	2.00	25.75	8.7
YEAR	1846.71	.00	35.55	342.26	23.68	303.58	8.7

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 629073. BTU/(SQFT-YEAR)

BLDG 630 - MESS HALL KITCHEN AREA - ZN 1 ECO-2 INSTALL RIGID INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.1058E+07
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.9312E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.0000	-.8341E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.0000	-.5701E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.0000	-.3965E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	-.4143E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	-.1095E+05
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	-.2731E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.0000	-.4945E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.0000	-.7996E+06
DEC	883.	604.	1.000	35.	0.	0.	0	12	.0000	-.1129E+07

BLDG 630 - MESS HALL DINING AREA - ZONE 2 BASELINE

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1

ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0

WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000

LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1

SKY CLEARNESS FACTOR (CLN) 1.000000

NUMBER OF ZONES (NZ) 1

WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1

WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******

FILE NAME MO

STATION 13995 YEAR 1955

SITE LATITUDE DEG (AL1) 37.750000

ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000

MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000

AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000

SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01

SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01

SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01

INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000

INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000

INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03

INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00

VOLUME OF ZONE IN CUBIC FEET (VOLHS) 76646.000000

FLOOR AREA (SQFT) 7190.000000

HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 936800.000000

COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -836640.000000

COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 71900.000000

CONSTANT INFILTRATION RATE CFM (CFMI) 700.000000

INFILTRATION PROFILE

1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

A FACTOR IN INFILTRATION EQUATION (CINA) 5.480000E-01

B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02

C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03

BUILDING THERMAL MASS MCP BTU/F (CMCP) 39779.000000

BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00

SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 213.000000

PARTITION UA BTU/HR-F (GUA) 0.000000E+00

DOOR UA BTU/HR-F (DUA) 49.000000

WINDOW GLASS NUMBER (NG) 30

DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01

NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01

WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	.0	1471.0	1446.0	1487.0
WINDOW AREA SQFT (AWND)	.0	144.0	84.0	128.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	.0	14.4	8.4	12.8
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.243	.245	.243
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01837	.01822	.01837	.01822
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00003	.00003	.00003	.00003
N=2	.00283	.00280	.00283	.00280
N=3	.01017	.01008	.01017	.01008
N=4	.00498	.00494	.00498	.00494
N=5	.00037	.00036	.00037	.00036
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	-.07415	-.07415	-.07415	-.07415
N=5	.00212	.00212	.00212	.00212
N=6	********	********	********	********

ROOF AREA SQFT (AROF) 7190.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.500000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.696739E-02
ROOF B TRANSFER FUNCTIONS (BNR)
.951E-03 .982E-02 .593E-02 .266E-03 380. 380.
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -.600 .822E-01 -.300E-03 999. 999.
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 5.000000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	8.	39972.	56700.	80200.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	75.0
2	.100	.000	.000	.000	70.0	75.0
3	.100	.000	.000	.000	70.0	75.0
4	.100	.000	.100	.100	70.0	75.0
5	.800	1.000	.500	.500	70.0	75.0
6	1.000	1.000	1.000	1.000	70.0	75.0
7	1.000	.800	1.000	1.000	70.0	75.0
8	1.000	.500	1.000	1.000	70.0	75.0

9	1.000	.300	.200	.200	70.0	75.0
10	1.000	.100	.200	.200	70.0	75.0
11	1.000	.500	.800	.800	70.0	75.0
12	1.000	1.000	1.000	1.000	70.0	75.0
13	1.000	1.000	1.000	1.000	70.0	75.0
14	1.000	.200	.200	.200	70.0	75.0
15	1.000	.200	.200	.200	70.0	75.0
16	1.000	.200	.200	.200	70.0	75.0
17	1.000	1.000	1.000	1.000	70.0	75.0
18	1.000	1.000	1.000	1.000	70.0	75.0
19	1.000	.800	.200	.200	70.0	75.0
20	.600	.300	.100	.100	70.0	75.0
21	.100	.000	.000	.000	70.0	75.0
22	.100	.000	.000	.000	70.0	75.0
23	.100	.000	.000	.000	70.0	75.0
24	.100	.000	.000	.000	70.0	75.0

NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 60.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 60.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 14000.000000
ECONOMIZER HIGH TEMP LIMIT F 65.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.000000
SYSTEM MIXED AIR TEMP(TMXAIR) 60.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 1.500000
HEATING PLANT RATED OUTPUT BTU (HFLOT) 936800.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 1171000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)

.100	.191	.200	.286	.300	.369	.400	.451
.500	.537	.600	.625	.700	.718	.800	.812
.900	.906	1.00	1.00				

CHILLER TYPE (ITYPCH) 0
COOLING PLANT RATED OUTPUT BTU (CFLOT) 836640.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 154670.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)

.100	.200	.200	.250	.300	.310	.400	.370
.500	.450	.600	.550	.700	.650	.800	.760
.900	.880	1.00	1.00				

BLDG 630 - MESS HALL DINING AREA - ZONE 2 BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	5.	0.	0.	0.	0.	0.	0.	0.
	-93.	LOSS		-7.	-7.	0.	-24.	-5.	-109.	0.
FEB	.07	GAIN	6.47	.00	.00	.00	.01	.00	.00	.04
	-71.21	LOSS		-6.13	-5.91	.00	-17.66	-4.24	-92.28	.00
MAR	5.22	GAIN	8.10	.07	.00	.00	.75	.00	.01	1.42
	-55.25	LOSS		-5.55	-5.50	.00	-13.92	-3.94	-85.26	.00
APR	26.41	GAIN	8.60	.39	.04	.00	3.10	.03	.54	7.08
	-19.53	LOSS		-3.36	-3.25	.00	-6.60	-2.33	-49.23	.00
MAY	59.64	GAIN	9.54	.84	.14	.00	6.36	.10	1.72	21.24
	-3.66	LOSS		-2.16	-1.87	.00	-2.53	-1.29	-29.83	.00
JUN	124.	GAIN	9.	1.	0.	0.	10.	0.	5.	60.
	0.	LOSS		-1.	-1.	0.	-1.	-1.	-11.	0.
JUL	156.	GAIN	10.	2.	1.	0.	13.	1.	12.	74.
	0.	LOSS		-1.	0.	0.	0.	0.	-7.	0.
AUG	149.	GAIN	9.	2.	1.	0.	11.	0.	9.	75.
	0.	LOSS		-1.	-1.	0.	0.	0.	-8.	0.
SEP	91.33	GAIN	7.22	.79	.35	.00	5.63	.26	4.64	44.98
	-4.62	LOSS		-1.91	-1.46	.00	-2.48	-1.03	-22.52	.00
OCT	26.06	GAIN	5.86	.19	.05	.00	1.29	.04	.69	10.35
	-16.83	LOSS		-3.60	-3.13	.00	-7.84	-2.19	-46.26	.00
NOV	6.99	GAIN	4.53	.02	.00	.00	.18	.00	.01	2.76
	-42.13	LOSS		-5.01	-4.53	.00	-14.18	-3.17	-67.81	.00
DEC	0.	GAIN	4.	0.	0.	0.	0.	0.	0.	0.
	-89.	LOSS		-7.	-7.	0.	-24.	-5.	-104.	0.
TOT	646.	GAIN	87.	7.	3.	0.	51.	2.	33.	297.
	-396.	LOSS		-46.	-41.	0.	-114.	-29.	-632.	0.

MAX HEATING LOAD= -405333. BTUH ON DEC 18 HOUR 4 AMBIENT TEMP 1.
MAX COOLING LOAD= 472820. BTUH ON JUL 28 HOUR 17 AMBIENT TEMP 92.

ZONE UA BTU/HR-F 1594.4

BLDG 630 - MESS HALL DINING AREA - ZONE 2 BASELINE

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	76.		4	13	64.	3.83	24.53	11.38	53.78
			69.	29	3	10.				
FEB	71.	76.		13	18	64.	3.46	22.16	10.28	48.57
			69.	2	3	15.				
MAR	71.	77.		12	13	74.	3.83	24.53	11.38	53.78
			69.	4	3	17.				
APR	73.	77.		30	13	82.	3.71	23.74	11.01	52.04
			69.	9	3	32.				
MAY	75.	77.		28	13	85.	3.83	24.53	11.38	53.78
			70.	11	4	38.				
JUN	76.	77.		27	13	88.	3.71	23.74	11.01	52.04
			70.	18	4	57.				
JUL	76.	77.		15	13	93.	3.83	24.53	11.38	53.78
			71.	10	4	57.				
AUG	76.	77.		12	13	86.	3.83	24.53	11.38	53.78
			70.	25	4	54.				
SEP	75.	77.		3	13	89.	3.71	23.74	11.01	52.04
			70.	15	3	41.				
OCT	73.	77.		4	13	83.	3.83	24.53	11.38	53.78
			70.	28	4	30.				
NOV	72.	76.		8	13	77.	3.71	23.74	11.01	52.04
			69.	3	3	18.				
DEC	70.	76.		23	18	55.	3.83	24.53	11.38	53.78
			69.	18	3	2.				
YEAR							45.13	288.87	134.00	633.20

BLDG 630 - MESS HALL DINING AREA - ZONE 2 BASELINE

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	657	20	0	0	-.3619E+06	.0000
FEB	543	20	0	0	-.3190E+06	.7472E+05
MAR	503	86	0	0	-.3047E+06	.2533E+06
APR	241	230	0	0	-.1956E+06	.2854E+06
MAY	64	425	0	0	-.1374E+06	.3451E+06
JUN	6	548	0	0	-.2716E+05	.4399E+06
JUL	0	654	0	0	.0000	.4728E+06
AUG	4	643	0	0	-.3306E+05	.4395E+06
SEP	80	458	0	0	-.1215E+06	.4582E+06
OCT	241	241	0	0	-.1860E+06	.3474E+06
NOV	430	114	0	0	-.2713E+06	.2736E+06
DEC	656	15	0	0	-.4053E+06	.8103E+05
YEAR	3425	3454	0	0	-.4053E+06	.4728E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	190.72	.00	3.83	24.53	3.33	53.78	12.1
FEB	153.79	.01	3.46	22.16	3.01	48.57	21.2
MAR	133.39	.43	3.83	24.53	3.33	53.78	26.2
APR	58.56	1.95	3.71	23.74	3.23	52.04	27.3
MAY	14.64	3.88	3.83	24.53	3.33	53.78	29.3
JUN	1.34	7.20	3.71	23.74	3.23	52.04	33.7
JUL	.00	8.94	3.83	24.53	3.33	53.78	35.5
AUG	.89	8.63	3.83	24.53	3.33	53.78	33.7
SEP	18.01	5.45	3.71	23.74	3.23	52.04	34.7
OCT	56.28	1.88	3.83	24.53	3.33	53.78	29.4
NOV	109.94	.60	3.71	23.74	3.23	52.04	26.9
DEC	189.15	.04	3.83	24.53	3.33	53.78	21.2
YEAR	926.72	39.00	45.13	288.87	39.26	633.20	35.5

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 227639. BTU/(SQFT-YEAR)

BLDG 630 - MESS HALL DINING AREA - ZONE 2 BASELINE

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	-	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.3619E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.7472E+05	-.3190E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.2533E+06	-.3047E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.2854E+06	-.1956E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.3451E+06	-.1374E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.4399E+06	-.2716E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.4728E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.4395E+06	-.3306E+05
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.4582E+06	-.1215E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.3474E+06	-.1860E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.2736E+06	-.2713E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.8103E+05	-.4053E+06

BLDG 630 - MESS HALL DINING AREA - ZN 2 ECO-1 INSTALL FIBERGLASS INSUL.

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 76646.000000
FLOOR AREA (SQFT) 7190.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 936800.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -836640.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 71900.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 700.000000
INFILTRATION PROFILE

1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

A FACTOR IN INFILTRATION EQUATION (CINA) 5.480000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 39779.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 213.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	.0	1471.0	1446.0	1487.0
WINDOW AREA SQFT (AWND)	.0	144.0	84.0	128.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	.0	14.4	8.4	12.8
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.064	.064	.064	.064
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00176	.00176	.00176	.00176
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00016	.00016	.00016	.00016
N=3	.00086	.00086	.00086	.00086
N=4	.00066	.00066	.00066	.00066
N=5	.00008	.00008	.00008	.00008
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	-.16643	-.16643	-.16643	-.16643
N=5	.00728	.00728	.00728	.00728
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 7190.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.500000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.696739E-02
ROOF B TRANSFER FUNCTIONS (BNR)
.951E-03 .982E-02 .593E-02 .266E-03 380. 380.
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -.600 .822E-01 -.300E-03 999. 999.
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 5.000000E-01

----------INTERNAL GAINS AND PROFILES ----------

					THERMOSTAT SET POINT DEG F	
	KW	- - - - - - BTU/HR - - - - - -				
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	8.	39972.	56700.	80200.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	75.0
2	.100	.000	.000	.000	70.0	75.0
3	.100	.000	.000	.000	70.0	75.0
4	.100	.000	.100	.100	70.0	75.0
5	.800	1.000	.500	.500	70.0	75.0
6	1.000	1.000	1.000	1.000	70.0	75.0
7	1.000	.800	1.000	1.000	70.0	75.0
8	1.000	.500	1.000	1.000	70.0	75.0

```
  9        1.000      .300      .200      .200        70.0        75.0
 10        1.000      .100      .200      .200        70.0        75.0
 11        1.000      .500      .800      .800        70.0        75.0
 12        1.000     1.000     1.000     1.000        70.0        75.0
 13        1.000     1.000     1.000     1.000        70.0        75.0
 14        1.000      .200      .200      .200        70.0        75.0
 15        1.000      .200      .200      .200        70.0        75.0
 16        1.000      .200      .200      .200        70.0        75.0
 17        1.000     1.000     1.000     1.000        70.0        75.0
 18        1.000     1.000     1.000     1.000        70.0        75.0
 19        1.000      .800      .200      .200        70.0        75.0
 20         .600      .300      .100      .100        70.0        75.0
 21         .100      .000      .000      .000        70.0        75.0
 22         .100      .000      .000      .000        70.0        75.0
 23         .100      .000      .000      .000        70.0        75.0
 24         .100      .000      .000      .000        70.0        75.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       60.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       60.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)    14000.000000
ECONOMIZER HIGH TEMP LIMIT F        65.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       60.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)          1.500000
HEATING PLANT RATED OUTPUT BTU (HFLOT)   936800.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   1171000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906      1.00      1.00
CHILLER TYPE (ITYPCH)             0
COOLING PLANT RATED OUTPUT BTU (CFLOT)    836640.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    154670.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .100      .200      .200      .250      .300      .310      .400      .370
 .500      .450      .600      .550      .700      .650      .800      .760
 .900      .880      1.00      1.00
```

BLDG 630 - MESS HALL DINING AREA - ZN 2 ECO-1 INSTALL FIBERGLASS INSUL.

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	5.	0.	0.	0.	0.	0.	0.	0.
	-76.	LOSS		-7.	-7.	0.	-6.	-5.	-109.	0.
FEB	.08	GAIN	6.47	.00	.00	.00	.00	.00	.00	.04
	-59.20	LOSS		-6.16	-5.94	.00	-4.68	-4.26	-93.16	.00
MAR	5.19	GAIN	8.10	.07	.00	.00	.04	.00	.01	1.38
	-46.30	LOSS		-5.57	-5.52	.00	-3.50	-3.95	-85.94	.00
APR	25.25	GAIN	8.60	.39	.04	.00	.43	.03	.54	6.98
	-16.69	LOSS		-3.38	-3.27	.00	-1.46	-2.34	-49.91	.00
MAY	56.29	GAIN	9.54	.84	.14	.00	1.30	.10	1.72	20.66
	-3.53	LOSS		-2.14	-1.85	.00	-.28	-1.28	-29.72	.00
JUN	115.	GAIN	9.	1.	0.	0.	2.	0.	5.	57.
	0.	LOSS		-1.	-1.	0.	0.	-1.	-11.	0.
JUL	144.	GAIN	10.	2.	1.	0.	3.	1.	12.	71.
	0.	LOSS		-1.	0.	0.	0.	0.	-7.	0.
AUG	138.	GAIN	9.	2.	1.	0.	3.	0.	9.	71.
	0.	LOSS		-1.	-1.	0.	0.	0.	-8.	0.
SEP	86.75	GAIN	7.22	.78	.35	.00	1.28	.26	4.64	43.43
	-4.17	LOSS		-1.91	-1.47	.00	-.40	-1.03	-22.80	.00
OCT	25.88	GAIN	5.86	.19	.05	.00	.16	.04	.69	10.17
	-13.60	LOSS		-3.63	-3.17	.00	-1.90	-2.21	-47.75	.00
NOV	7.38	GAIN	4.53	.02	.00	.00	.01	.00	.01	2.80
	-33.58	LOSS		-5.04	-4.57	.00	-3.69	-3.20	-69.11	.00
DEC	0.	GAIN	4.	0.	0.	0.	0.	0.	0.	0.
	-73.	LOSS		-7.	-7.	0.	-6.	-5.	-105.	0.
TOT	603.	GAIN	87.	7.	3.	0.	12.	2.	33.	284.
	-326.	LOSS		-46.	-41.	0.	-28.	-29.	-638.	0.

MAX HEATING LOAD= -356360. BTUH ON DEC 18 HOUR 2 AMBIENT TEMP 3.
MAX COOLING LOAD= 446013. BTUH ON SEP 2 HOUR 13 AMBIENT TEMP 93.

ZONE UA BTU/HR-F 803.2

BLDG 630 - MESS HALL DINING AREA - ZN 2 ECO-1 INSTALL FIBERGLASS INSUL.

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	71.	76.		4	13	64.	3.83	24.53	11.38	53.78
			69.	29	3	10.				
FEB	71.	76.		9	13	57.	3.46	22.16	10.28	48.57
			69.	2	3	15.				
MAR	72.	77.		12	13	74.	3.83	24.53	11.38	53.78
			69.	4	3	17.				
APR	73.	77.		24	13	80.	3.71	23.74	11.01	52.04
			70.	1	1	33.				
MAY	74.	77.		28	13	85.	3.83	24.53	11.38	53.78
			70.	11	3	38.				
JUN	75.	77.		27	13	88.	3.71	23.74	11.01	52.04
			70.	17	4	56.				
JUL	76.	77.		15	13	93.	3.83	24.53	11.38	53.78
			70.	10	4	57.				
AUG	76.	77.		12	13	86.	3.83	24.53	11.38	53.78
			70.	25	4	54.				
SEP	75.	77.		3	13	89.	3.71	23.74	11.01	52.04
			70.	15	3	41.				
OCT	73.	77.		5	13	80.	3.83	24.53	11.38	53.78
			70.	28	3	32.				
NOV	72.	76.		8	13	77.	3.71	23.74	11.01	52.04
			70.	3	3	18.				
DEC	71.	76.		29	13	63.	3.83	24.53	11.38	53.78
			69.	18	3	2.				
YEAR							45.13	288.87	134.00	633.20

BLDG 630 - MESS HALL DINING AREA - ZN 2 ECO-1 INSTALL FIBERGLASS INSUL.

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	628	27	0	0	-.3264E+06	.0000
FEB	506	38	0	0	-.2829E+06	.7871E+05
MAR	473	95	0	0	-.2710E+06	.2475E+06
APR	223	234	0	0	-.1700E+06	.2854E+06
MAY	72	407	0	0	-.1229E+06	.3311E+06
JUN	10	501	0	0	-.3178E+05	.4212E+06
JUL	1	610	0	0	-9935.	.4404E+06
AUG	5	593	0	0	-.3528E+05	.4225E+06
SEP	80	444	0	0	-.1093E+06	.4460E+06
OCT	214	260	0	0	-.1650E+06	.3433E+06
NOV	395	131	0	0	-.2359E+06	.2765E+06
DEC	616	20	0	0	-.3564E+06	.1124E+06
YEAR	3223	3360	0	0	-.3564E+06	.4460E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
MONTH	HEATING MILLION BTU	COOLING THOUSAND KWH	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FANS THOUSAND KWH	HEAT GAIN MILLION BTU	ELECTRIC DEMAND KW
JAN	171.17	.00	3.83	24.53	3.33	53.78	12.1
FEB	136.42	.01	3.46	22.16	3.01	48.57	21.2
MAR	120.69	.43	3.83	24.53	3.33	53.78	26.1
APR	53.05	1.86	3.71	23.74	3.23	52.04	27.3
MAY	16.24	3.67	3.83	24.53	3.33	53.78	28.8
JUN	2.23	6.62	3.71	23.74	3.23	52.04	32.7
JUL	.22	8.26	3.83	24.53	3.33	53.78	33.7
AUG	1.12	7.94	3.83	24.53	3.33	53.78	32.7
SEP	17.89	5.18	3.71	23.74	3.23	52.04	34.0
OCT	49.18	1.85	3.83	24.53	3.33	53.78	29.3
NOV	97.56	.61	3.71	23.74	3.23	52.04	27.0
DEC	167.45	.04	3.83	24.53	3.33	53.78	22.0
YEAR	833.22	36.46	45.13	288.87	39.26	633.20	34.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 213430. BTU/(SQFT-YEAR)

BLDG 630 - MESS HALL DINING AREA - ZN 2 ECO-1 INSTALL FIBERGLASS INSUL.

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.3264E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.7871E+05	-.2829E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.2475E+06	-.2710E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.2854E+06	-.1700E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.3311E+06	-.1229E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.4212E+06	-.3178E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.4404E+06	-9935.
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.4225E+06	-.3528E+05
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.4460E+06	-.1093E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.3433E+06	-.1650E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.2765E+06	-.2359E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.1124E+06	-.3564E+06

BLDG 630 - MESS HALL DINING AREA - ZN 2 ECO-2 INSTALL RIDIG INSULATION
---------- PROGRAM CONTROL OPTIONS ----------
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0
--------- SITE AND BUILDING DATA ----------
******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 76646.000000
FLOOR AREA (SQFT) 7190.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 936800.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -836640.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 71900.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 700.000000
INFILTRATION PROFILE

1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

A FACTOR IN INFILTRATION EQUATION (CINA) 5.480000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 39779.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 213.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	.0	1471.0	1446.0	1487.0
WINDOW AREA SQFT (AWND)	.0	144.0	84.0	128.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	.0	14.4	8.4	12.8
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.055	.055	.055	.055
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00174	.00174	.00174	.00174
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00019	.00019	.00019	.00019
N=3	.00089	.00089	.00089	.00089
N=4	.00059	.00059	.00059	.00059
N=5	.00007	.00007	.00007	.00007
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	-.14508	-.14508	-.14508	-.14508
N=5	.00613	.00613	.00613	.00613
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 7190.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.500000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.696739E-02
ROOF B TRANSFER FUNCTIONS (BNR)
.951E-03 .982E-02 .593E-02 .266E-03 380. 380.
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -.600 .822E-01 -.300E-03 999. 999.
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 5.000000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	8.	39972.	56700.	80200.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	75.0
2	.100	.000	.000	.000	70.0	75.0
3	.100	.000	.000	.000	70.0	75.0
4	.100	.000	.100	.100	70.0	75.0
5	.800	1.000	.500	.500	70.0	75.0
6	1.000	1.000	1.000	1.000	70.0	75.0
7	1.000	.800	1.000	1.000	70.0	75.0
8	1.000	.500	1.000	1.000	70.0	75.0

```
  9        1.000      .300      .200      .200        70.0        75.0
 10        1.000      .100      .200      .200        70.0        75.0
 11        1.000      .500      .800      .800        70.0        75.0
 12        1.000     1.000     1.000     1.000        70.0        75.0
 13        1.000     1.000     1.000     1.000        70.0        75.0
 14        1.000      .200      .200      .200        70.0        75.0
 15        1.000      .200      .200      .200        70.0        75.0
 16        1.000      .200      .200      .200        70.0        75.0
 17        1.000     1.000     1.000     1.000        70.0        75.0
 18        1.000     1.000     1.000     1.000        70.0        75.0
 19        1.000      .800      .200      .200        70.0        75.0
 20         .600      .300      .100      .100        70.0        75.0
 21         .100      .000      .000      .000        70.0        75.0
 22         .100      .000      .000      .000        70.0        75.0
 23         .100      .000      .000      .000        70.0        75.0
 24         .100      .000      .000      .000        70.0        75.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       60.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       60.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)    14000.000000
ECONOMIZER HIGH TEMP LIMIT F        65.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       60.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)          1.500000
HEATING PLANT RATED OUTPUT BTU (HFLOT)   936800.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   1171000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906      1.00      1.00
CHILLER TYPE (ITYPCH)             0
COOLING PLANT RATED OUTPUT BTU (CFLOT)    836640.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    154670.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .100      .200      .200      .250      .300      .310      .400      .370
 .500      .450      .600      .550      .700      .650      .800      .760
 .900      .880      1.00      1.00
```

BLDG 630 - MESS HALL DINING AREA - ZN 2 ECO-2 INSTALL RIDIG INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	5.	0.	0.	0.	0.	0.	0.	0.
	-75.	LOSS		-7.	-7.	0.	-5.	-5.	-109.	0.
FEB	.08	GAIN	6.47	.00	.00	.00	.00	.00	.00	.04
	-58.63	LOSS		-6.16	-5.94	.00	-4.02	-4.26	-93.25	.00
MAR	5.20	GAIN	8.10	.07	.00	.00	.04	.00	.01	1.38
	-45.92	LOSS		-5.57	-5.52	.00	-3.02	-3.96	-86.03	.00
APR	25.26	GAIN	8.60	.39	.04	.00	.39	.03	.54	6.98
	-16.59	LOSS		-3.38	-3.27	.00	-1.27	-2.34	-49.95	.00
MAY	56.21	GAIN	9.54	.84	.14	.00	1.14	.10	1.72	20.66
	-3.55	LOSS		-2.13	-1.84	.00	-.26	-1.28	-29.67	.00
JUN	114.	GAIN	9.	1.	0.	0.	2.	0.	5.	57.
	0.	LOSS		-1.	-1.	0.	0.	-1.	-11.	0.
JUL	143.	GAIN	10.	2.	1.	0.	3.	1.	12.	71.
	0.	LOSS		-1.	0.	0.	0.	0.	-7.	0.
AUG	137.	GAIN	9.	2.	1.	0.	2.	0.	9.	70.
	0.	LOSS		-1.	-1.	0.	0.	0.	-8.	0.
SEP	86.44	GAIN	7.22	.78	.35	.00	1.11	.26	4.64	43.26
	-4.17	LOSS		-1.91	-1.47	.00	-.36	-1.03	-22.81	.00
OCT	25.92	GAIN	5.86	.19	.05	.00	.15	.04	.69	10.17
	-13.49	LOSS		-3.63	-3.17	.00	-1.64	-2.21	-47.84	.00
NOV	7.41	GAIN	4.53	.02	.00	.00	.01	.00	.01	2.80
	-33.20	LOSS		-5.04	-4.57	.00	-3.18	-3.20	-69.21	.00
DEC	0.	GAIN	4.	0.	0.	0.	0.	0.	0.	0.
	-72.	LOSS		-7.	-7.	0.	-5.	-5.	-105.	0.
TOT	601.	GAIN	87.	7.	3.	0.	10.	2.	33.	284.
	-323.	LOSS		-46.	-41.	0.	-24.	-29.	-639.	0.

MAX HEATING LOAD= -354759. BTUH ON DEC 18 HOUR 2 AMBIENT TEMP 3.
MAX COOLING LOAD= 445570. BTUH ON SEP 2 HOUR 13 AMBIENT TEMP 93.

ZONE UA BTU/HR-F 763.6

BLDG 630 - MESS HALL DINING AREA - ZN 2 ECO-2 INSTALL RIDIG INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL INTERNAL HEAT GAIN MILLION BTU
JAN	71.	76.		4	13	64.	3.83	24.53	11.38	53.78
			69.	29	3	10.				
FEB	71.	76.		9	13	57.	3.46	22.16	10.28	48.57
			69.	2	3	15.				
MAR	72.	77.		12	13	74.	3.83	24.53	11.38	53.78
			69.	12	4	61.				
APR	73.	77.		24	13	80.	3.71	23.74	11.01	52.04
			70.	1	1	33.				
MAY	74.	77.		28	13	85.	3.83	24.53	11.38	53.78
			70.	11	3	38.				
JUN	75.	77.		27	13	88.	3.71	23.74	11.01	52.04
			70.	17	4	56.				
JUL	76.	77.		15	13	93.	3.83	24.53	11.38	53.78
			70.	10	4	57.				
AUG	76.	77.		12	13	86.	3.83	24.53	11.38	53.78
			70.	25	4	54.				
SEP	75.	77.		3	13	89.	3.71	23.74	11.01	52.04
			70.	15	3	41.				
OCT	73.	77.		5	13	80.	3.83	24.53	11.38	53.78
			70.	28	3	32.				
NOV	72.	76.		8	13	77.	3.71	23.74	11.01	52.04
			70.	3	3	18.				
DEC	71.	76.		29	13	63.	3.83	24.53	11.38	53.78
			69.	18	3	2.				
YEAR							45.13	288.87	134.00	633.20

BLDG 630 - MESS HALL DINING AREA - ZN 2 ECO-2 INSTALL RIDIG INSULATION

	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED		NUMBER OF HOURS WHEN LOADS WERE NOT MET		MAXIMUM LOADS BTU	
MONTH	HEATING	COOLING INCLUDING ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	626	27	0	0	-.3253E+06	.0000
FEB	505	38	0	0	-.2816E+06	.7971E+05
MAR	471	97	0	0	-.2700E+06	.2481E+06
APR	223	234	0	0	-.1696E+06	.2853E+06
MAY	72	407	0	0	-.1228E+06	.3308E+06
JUN	11	499	0	0	-.3266E+05	.4207E+06
JUL	1	607	0	0	-.1204E+05	.4396E+06
AUG	5	588	0	0	-.3582E+05	.4221E+06
SEP	80	442	0	0	-.1091E+06	.4456E+06
OCT	214	261	0	0	-.1644E+06	.3433E+06
NOV	394	132	0	0	-.2347E+06	.2767E+06
DEC	613	22	0	0	-.3548E+06	.1142E+06
YEAR	3215	3354	0	0	-.3548E+06	.4456E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	170.17	.00	3.83	24.53	3.33	53.78	12.1
FEB	135.82	.01	3.46	22.16	3.01	48.57	21.2
MAR	120.03	.43	3.83	24.53	3.33	53.78	26.1
APR	52.99	1.86	3.71	23.74	3.23	52.04	27.3
MAY	16.24	3.67	3.83	24.53	3.33	53.78	28.8
JUN	2.45	6.60	3.71	23.74	3.23	52.04	32.6
JUL	.22	8.23	3.83	24.53	3.33	53.78	33.7
AUG	1.12	7.89	3.83	24.53	3.33	53.78	32.7
SEP	17.89	5.16	3.71	23.74	3.23	52.04	34.0
OCT	49.15	1.85	3.83	24.53	3.33	53.78	29.3
NOV	97.16	.61	3.71	23.74	3.23	52.04	27.0
DEC	166.24	.04	3.83	24.53	3.33	53.78	22.0
YEAR	829.48	36.34	45.13	288.87	39.26	633.20	34.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 212854. BTU/(SQFT-YEAR)

BLDG 630 - MESS HALL DINING AREA - ZN 2 ECO-2 INSTALL RIDIG INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.3253E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.7971E+05	-.2816E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.2481E+06	-.2700E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.2853E+06	-.1696E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.3308E+06	-.1228E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.4207E+06	-.3266E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.4396E+06	-.1204E+05
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.4221E+06	-.3582E+05
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.4456E+06	-.1091E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.3433E+06	-.1644E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.2767E+06	-.2347E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.1142E+06	-.3548E+06

BUILDING MANAGER INTERVIEW

BUILDING INFORMATION:							
Building No:	630		Building Name:	Mess Hall			
Surveyed by:	DMS		Date:	11/7/95	Building Use:	Dinng Facility	
Building Contact:					Phone No:		
Building Contact:					Phone No:		
OCCUPANCY:							
Number of Employees:	Mon./Fri.:	20	Schedule:		300	To	2100
	Tues./Thurs	20			300	To	2100
	Wed.	20			300	To	2100
	Sat./Sun.	20			800	To	1900
Visitors Per Day:	Mon./Fri.:	270	Schedule:		600	To	2100
	Tues./Thurs	270			600	To	2100
	Wed.	270			600	To	2100
	Sat./Sun.	270			900	To	1800
Comments:							
LIGHTING SCHEDULE:							
Normal Occupancy:	Mon.-Fri.:		Schedule:		300	To	2100
	Sat./Sun.:				800	To	1900
Cleaning Crew/2nd Shift:	Mon.-Fri.:		Schedule:			To	
	Sat./Sun.:					To	
EQUIPMENT SCHEDULE:							
Fan/AHU Schedule:	Mon.-Fri.:		Schedule:		0	To	2400
	Sat./Sun.:				0	To	2400
Chiller Schedule:	Mon.-Fri.:		Schedule:		0	To	2400
	Sat./Sun.:				0	To	2400
Boiler Schedule:	Mon.-Fri.:		Schedule:		0	To	2400
	Sat./Sun.:				0	To	2400
Aux. Equipment Schedule:							
	Mon.-Fri.:		Schedule:			To	
	Sat./Sun.:					To	
	Mon.-Fri.:		Schedule:			To	
	Sat./Sun.:					To	
Comments:							

Building No 630 **Building Name:** Mess Hall

BUILDING ENVELOPE

EXTERIOR WALLS

Wall Direction (N, E, W, or S)	Wall Construction No.	Comments
N	XW-1	
E	XW-1; XW-5	
S	XW-1	
W	XW-1; XW-5	

LIST OF EXT. WALL CONSTRUCTION TYPES

Wall Construction No.	Description
XW-1	Face Brick & CMU
XW-2	Face Brick, CMU, & Gyp. Board
XW-3	Face Brick, CMU, & Ceramic Tile
XW-4	Face Brick, CMU, & Plaster Coat
XW-5	Insulated Metal Panel

WINDOWS

Window Direction (N, E, W, or S)	Window Construction No.	Comments
N	W-1	
E	W-1	
S	W-1	
W	W-1	

LIST OF WINDOW TYPES

Window Construction No.	Description
W-1	Double Pane Clear
W-2	Double Pane Tinted
W-3	Single Pane with Storm Windows
W-4	Single Pane

ROOF CONSTRUCTION

Roof Location	Roof Construction No.	Comments
Kitchen	R-4	
Dining	R-4	

LIST OF ROOF CONSTRUCTION TYPES

Roof Construction No.	Description
R-1	BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile
R-2	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Ceiling Tile
R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Clg
R-4	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plaster Clg.
R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceiling Tile
R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaster Clg.

Building No 630 **Building Name:** Mess Hall

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

INTERIOR EQUIPMENT AND OBJECTS				LIST OF EQUIPMENT AND OBJECTS	
Wall Direction (N, E, W, or S)	Item No.	No. of Items	Comments	Item No.	Description
					Architectural
				A-1	Interior Partitions
N	M-4	1	Distance from ext. wall to nearest int. wall	A-2	Wall Placards
N	F-4	1	is 4'-0" w/ a 5" ledge at the base of the	A-3	Drapery Valances
N	A-2	2	exterior wall.	A-4	Drapery Rods
N	A-6	1		A-5	Bleachers
				A-6	Soap Dispenser
S	P-5	2			
S	E-2	2			**Plumbing**
S	E-5	1		P-1	Sinks
S	A-4	1		P-2	Commodes
				P-3	Toilet Stalls
E	M-6	1		P-4	Water Fountains
E	C-4	1		P-5	Large Kitchen Sink
E	M-3	2	24' Long		
E	M-3	1	12' Long		**HVAC Mechanical**
E	M-3	1	3' Long	M-1	Floor Supply/Return Grilles
E	A-4	16		M-2	Ceiling Supply/Return Grilles
				M-3	Finned-Tube Baseboard Radiators
W	M-3	2	24' Long	M-4	Thermostats / Space Temp. Sensors
W	M-3	1	12' Long	M-5	Wall mounted convection type heater
W	C-4	1		M-6	1/2" Hot & Cold Water Piping
W	M-3	1	3' Long		
W	P-3	2			
W	P-2	2			**Electrical**
				E-1	Electrical Panels
				E-2	Electrical Outlets
				E-3	Electrical Light Switches
				E-4	Electrican Conduit
				E-5	Emergency light
				E-6	Electrical Disconnect
					Lighting
				L-1	Wall Mounted Fixtures
				L-2	Ceiling Mounted Fixtures
				L-3	Exit Signs
					Fire Protection
				F-1	Alarm Pull Switches
				F-2	Alarm Sound Devices (Speakers, Bells)
				F-3	Sprinkler Heads
				F-4	Fire Extinguishes
					Communication
				C-1	Telephones - Wall Mounted
				C-2	Telephones - Booth Mounted
				C-3	Telephone Jacks

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
BLDG: **630** FILE: **630AH1**

AIR HANDLING UNIT SURVEY OBSERVATIONS

AHU-1	AHU NO.	**ATTIC WEST**	LOCATION (RM)
C.P.	REF. SYS. SERVING AHU	**DINING ROOM**	SERVES AREA

UNIT TYPE:

X	SINGLE ZN		2-PIPE FC		4-PIPE FC		UNIT HTR	X	H&V
	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION		VAV
	NUMBER OF ZONES				OTHER				
	COMMENT:								

NAMEPLATE:

N/A					MFG.				MODEL
15.0	SUPPLY FAN HP		**CENTURY**		MFG.		**323576-03**		MODEL
	RET/EXH FAN HP				MFG.				MODEL
2800	CFM-HTG	2800	CFM-CLG	10%	MIN %OA	100%	MAX %OA	50%	% HTG AREA SERVED
COMMENT:		**(SF) 200-208V, 40 A, 3 PH**							

COILS:

X	NONE		STM		HW		ELEC		MOD VLV	PREHEAT
	NONE		STM	X	HW		ELEC	X	MOD VLV	HEATING
X	NONE		STM		HW		ELEC		MOD VLV	REHEAT
X	NONE		STM		HW		ELEC		MOD VLV	HUMID.
	NONE		DX	X	CW			X	MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	**YES**
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	1	1	1	1	1	1	1	1

CONTROLS:

		PNEUMATIC	X	ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK			**TIMECLOCK HAS NO PINS**
SPACE SETPOINT (oF):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (oF):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Y	MAX OA (Y/N)	Y	RA (Y/N)	N	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:	Y	YES		NO					
COMMENTS:	**BARBER COLEMAN CONTROLS, ELECTRIC VALVE ACTUATORS, HOA**								

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE: **630AH2**

BLDG: **630**

AIR HANDLING UNIT SURVEY OBSERVATIONS

AHU-2	AHU NO.	**ATTIC EAST**	LOCATION (RM)
C.P.	REF. SYS. SERVING AHU	**DINING ROOM**	SERVES AREA

UNIT TYPE:

X	SINGLE ZN		2-PIPE FC		4-PIPE FC		UNIT HTR		H&V
	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION		VAV
	NUMBER OF ZONES				OTHERS				
	COMMENT:								

NAMEPLATE:

N/A					MFG.				MODEL
15.0	SUPPLY FAN HP		**CENTURY**		MFG.	**323576-03**			MODEL
	RET/EXH FAN HP				MFG.				MODEL
2800	CFM-HTG	2800	CFM-CLG	10%	MIN %OA	100%	MAX %OA	50%	% HTG AREA SERVED
COMMENT:	**(SF) 200-208V, 40 A, 3 PH**								

COILS:

X	NONE		STM		HW		ELEC		MOD VLV	PREHEAT
	NONE		STM	X	HW		ELEC	X	MOD VLV	HEATING
X	NONE		STM		HW		ELEC		MOD VLV	REHEAT
X	NONE		STM		HW		ELEC		MOD VLV	HUMID.
	NONE		DX	X	CW			X	MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	**YES, NO PINS**
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	1	1	1	1	1	1	1	1

CONTROLS:

		PNEUMATIC	X	ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK			
SPACE SETPOINT (oF):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (oF):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Y	MAX OA (Y/N)	Y	RA (Y/N)	N	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:	Y	YES		NO					
COMMENTS:	**BARBER COLEMAN CONTROLS, ELECTRIC VALVE ACTUATORS, HOA**								

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
BLDG: **630** FILE: **630HV1**

AIR HANDLING UNIT SURVEY OBSERVATIONS

HV-1	AHU NO.	**ATTIC WEST**	LOCATION (RM)
	REF. SYS. SERVING AHU	**KITCHEN**	SERVES AREA

UNIT TYPE:

	SINGLE ZN		2-PIPE FC		4-PIPE FC		UNIT HTR	X	H&V
	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION		VAV
	OTHER				OTHER				
	COMMENT:								

NAMEPLATE:

N/A					MFG.				MODEL
5.0	SUPPLY FAN HP		N/A		MFG.				MODEL
	RET/EXH FAN HP				MFG.				MODEL
1800	CFM-HTG	0	CFM-CLG	100%	MIN %OA	100%	MAX %OA	50%	% HTG AREA SERVED
COMMENT:									

COILS:

X	NONE		STM		HW		ELEC		MOD VLV	PREHEAT
	NONE		STM	X	HW		ELEC	X	MOD VLV	HEATING
X	NONE		STM		HW		ELEC		MOD VLV	REHEAT
X	NONE		STM		HW		ELEC		MOD VLV	HUMID.
X	NONE		STM		HW		ELEC		MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	0	0	0	0	0	1	1	1

CONTROLS:

		PNEUMATIC	X	ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK			
SPACE SETPOINT (oF):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (oF):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:		MIN OA (Y/N)		MAX OA (Y/N)		RA (Y/N)		EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:		YES	N	NO					
COMMENTS:	**BARBER COLEMAN CONTROLS**								

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE: **630HV2**

BLDG: **630**

AIR HANDLING UNIT SURVEY OBSERVATIONS

HV-2	AHU NO.	**ATTIC EAST**	LOCATION (RM)
	REF. SYS. SERVING AHU	**KITCHEN**	SERVES AREA

UNIT TYPE:

	SINGLE ZN		2-PIPE FC		4-PIPE FC		UNIT HTR	X	H&V
	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION		VAV
	OTHER				OTHER				
	COMMENT:								

NAMEPLATE:

N/A					MFG.				MODEL
3.0	SUPPLY FAN HP		**MARATHON**		MFG.	**SVE162TTDR**			MODEL
	RET/EXH FAN HP				MFG.				MODEL
1800	CFM-HTG	0	CFM-CLG	100%	MIN %OA	100%	MAX %OA	50%	% HTG AREA SERVED
COMMENT:			**(SF) 208V, 3PH, 9.4A, 1730 RPM**						

COILS:

X	NONE		STM		HW		ELEC		MOD VLV	PREHEAT
	NONE		STM	X	HW		ELEC	X	MOD VLV	HEATING
X	NONE		STM		HW		ELEC		MOD VLV	REHEAT
X	NONE		STM		HW		ELEC		MOD VLV	HUMID.
X	NONE		STM		HW		ELEC		MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	0	0	0	0	0	1	1	1

CONTROLS:

		PNEUMATIC	X	ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK			
SPACE SETPOINT (oF):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (oF):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Y	MAX OA (Y/N)		RA (Y/N)		EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:		YES	N	NO					
COMMENTS:	**BARBER COLEMAN CONTROLS**								

EMC ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
BLDG: **630**
FILE: **630CV1**

BOILER & CONVERTER SURVEY OBSERVATIONS

CV-1	BOILER/CONVERTER NO.	MECH RM	LOCATION (RM)
C.P.	SOURCE OF HEATING (PLANT)	ALL	SERVES AREA

UNIT TYPE:

	STEAM		PSIG		HW		TEMP.		BOILER TYPE:
	NO.2 OIL		NO.6 OIL		N.GAS		ELEC		FUELS:
X	STM/HW		HTHW/HW		HTHW/STM		OTHER		CONVERTER TYPE:
X	SPACE HEAT		DHW		OTHER				USE:
COMMENT:									% HTG AREA SERVED
									BB RADIATION ONLY

NAMEPLATE:

N/A	MFG.		MODEL	1300000	CAPACITY OUTPUT (BTUH)
				1300000	CAPACITY INPUT (BTUH)
	MFG.		MODEL		CAPACITY OUTPUT (BTUH)
					CAPACITY INPUT (BTUH)

1.5	HW PUMP 1 - HP	MARATHON	MFG.	LVL145TDDR795330WFL	MODEL
	HW PUMP 2 - HP		MFG.		MODEL
	HW PUMP 3 - HP		MFG.		MODEL

COMMENT: 200V, 5.5A, 3PH, 1745 RPM

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D

CONTROLS:

		PNEUMATIC	X	ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		PSIG		HW SUPPLY					
RESET CONTROL (oF):		HW HIGH		HW LOW		OA LOW		OA HIGH	
BURNER CONTROLS		O2 TRIM (Y/N)		OTHER					
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD
BLDG: 630

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 630PMP

REFRIGERATION EQUIPMENT SURVEY OBSERVATIONS

CHW PUMP	CHILLER/COMPRESSOR NO.	MECH. ROOM	LOCATION (RM)

UNIT TYPE:

	CENTRIFUGAL WITH WATER SIDE COOLING TOWER						OTHER
	RECIPROCATING WITH WATER SIDE COOLING TOWER						AHU'S SERVED
	RECIPROCATING WITH AIR COOLED CONDENSING UNIT						
	ABSORBTION WITH WATER SIDE COOLING TOWER						
	AIR COOLED CONDENSING UNIT						
	CHW		DX	X	OTHER		**CHW PUMP ONLY**

NAMEPLATE:

CHILLER		MFG.				MODEL				SERIAL NO.
	VOLTS		AMPS		PH		HZ		CAPACITY (TONS)	
TOWER		MFG.				MODEL				# OF FANS
	VOLTS		AMPS		PH		HZ		HP	
CW PUMP **HOWELL**		MFG.	**2247AD3**			MODEL				SERIAL NO.
208	VOLTS	**13**	AMPS	**3**	PH	**60**	HZ	**5**	HP	
CNW PUMP		MFG.				MODEL				SERIAL NO.
	VOLTS		AMPS		PH		HZ		HP	
COMMENTS:										

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
0	0	0	0	1	1	1	1	1	0	0	0

CONTROLS:

		PNEUMATIC	X	ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		CWS (oF)		CWR (oF)		CNWS (oF)		CNWR (oF)	**NONE**
PANEL INDICATORS									
- PRESSURE		LITE-HI		LITE-LOW		GAUGES			
- TEMPERATURE		LITE-HI		LITE-LOW		GAUGES			
- OTHER									
COMMENTS:									

ANNUAL ENERGY SAVINGS SUMMARY
FOR ADMINISTRATION BUILDINGS - BLDGS 638, 743, & 832

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Baseline Annual Electric (MBtu)	ECO 1 - Annual Electric (MBtu)	Annual Electric Energy Savings (MBtu)	Baseline Peak Electric Demand (kW)	ECO 1 - Peak Electric Demand (kW)	Peak Electric Demand Savings (kW)	Baseline Nat. Gas Energy Savings (MBtu)	ECO 1 - Annual Nat. Gas (MBtu)	Annual Nat. Gas Energy Savings (MBtu)
638	56.89	51.64	5.26	18.20	18.20	0.00	358.89	325.76	33.13

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 638 (SF)	Square Foot Adjust-ment Factor	Annual Electric Energy Savings (MBtu)	Adjusted Annual Electric Energy Savings* (MBtu)	Peak Electric Demand Savings (kW)	Adjusted Peak Electric Demand Savings* (kW)	Annual Nat. Gas Energy Savings (MBtu)	Adjusted Annual Nat. Gas Energy Savings* (MBtu)
743	3,700	3,700	1.000	5.26	5.26	0.00	0.00	33.13	33.13
832	3,700	3,700	1.000	5.26	5.26	0.00	0.00	33.13	33.13

*Energy savings prorated on a square foot basis

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Baseline Annual Electric (MBtu)	ECO 2 - Annual Electric (MBtu)	Annual Electric Energy Savings (MBtu)	Baseline Peak Electric Demand (kW)	ECO 2 - Peak Electric Demand (kW)	Peak Electric Demand Savings (kW)	Baseline Annual Nat. Gas (MBtu)	ECO 2 - Annual Nat. Gas (MBtu)	Annual Nat. Gas Energy Savings (MBtu)
638	56.89	51.33	5.56	18.20	18.20	0.00	358.89	324.08	34.81

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 638 (SF)	Square Foot Adjust-ment Factor	Annual Electric Energy Savings (MBtu)	Adjusted Annual Electric Energy Savings* (MBtu)	Peak Electric Demand Savings (kW)	Adjusted Peak Electric Demand Savings* (kW)	Annual Nat. Gas Energy Savings (MBtu)	Adjusted Annual Nat. Gas Energy Savings* (MBtu)
743	3,700	3,700	1.000	5.56	5.56	0.00	0.00	34.81	34.81
832	3,700	3,700	1.000	5.56	5.56	0.00	0.00	34.81	34.81

*Energy savings prorated on a square foot basis

INVESTMENT COST SUMMARY
FOR ADMINISTRATION BUILDINGS - BLDGS 638, 743, & 832

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Investment Cost ($)
638	$21,565

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 638 (SF)	Square Foot Adjust-ment Factor	Investment Cost ($)*	Adjusted Investment Cost ($)*
743	3,700	3,700	1.000	$21,565	$21,565
832	3,700	3,700	1.000	$21,565	$21,565

*Investment Cost prorated on a square foot basis

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Investment Cost ($)
638	$21,836

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 638 (SF)	Square Foot Adjust-ment Factor	Investment Cost ($)	Adjusted Investment Cost ($)*
743	3,700	3,700	1.000	$21,836	$21,836
832	3,700	3,700	1.000	$21,836	$21,836

*Investment Cost prorated on a square foot basis

LIFE CYCLE COST ANALYSIS SUMMARY

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Leonard Wood	REGION: 2 (Missouri)		PROJECT NO:	1406-011
PROJECT TITLE:	Limited Energy Study, Insulate Brick Buildings			FISCAL YEAR:	1996
ANALYSIS DATE:	02/18/96	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz

1. INVESTMENT: **BLDG 638 - INSTALL 3.5" FIBERGLASS BATT INSULATION ON WALLS**

A.	CONSTRUCTION COST	=	$19,084	
B.	SIOH COST	(7.0% of 1A) =	$1,336	
C.	DESIGN COST	(6.0% of 1A) =	$1,145	
D.	TOTAL COST	(1A +1B +1C) =	$21,565	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT	=	$0	
F.	PUBLIC UTILITY COMPANY REBATE	=	$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$21,565

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96

	ENERGY SOURCE	FUEL COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$7.33	5.26	$39	13.80	$532	
B.	DIST	$0.00	0	$0	0.00	$0	
C.	NAT GAS	$5.30	33.13	$176	17.76	$3,118	
D.	COAL	$0.00	0	$0	0.00	$0	
E.	ELEC. DEMAND			$0	13.47	$0	
F.	TOTAL		38.39	$214		-------->	$3,650

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1	ANNUAL MAINTENANCE	$0	$0
2		$0	$0
3		$0	$0
4	TOTAL ANNUAL DISC. SAVINGS (+) / COST	$0	$0

B. NON-RECURRING (+/-)

	ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)
a.	BASELINE EQUIP. REPLCMNT.				$0
b.					$0
c.					$0
d.					$0
e.					$0
f.	TOTAL	$0			$0

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = $0

4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3 + 3A4 + (3Bf1/Economic Life)) $214

5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = 100.72

6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) = $3,650

7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.17
(MUST HAVE SIR > 1.25 TO QUALIFY)

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood,MO	SHEET 1	OF 1
ENGINEER	E M C Engineers, Inc.	DATE PREPARED	18-Feb-96
	Denver, CO	ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST Quantity	Unit Cost	Total	LABOR COST Crew/ Worker	Hours/ Unit	Total	TOTAL
1		**BUILDING 638**								
2		**INSTALL 3.5" BATT INSULATION ON WALLS**								
3										
4										
5	I3-1/2I	INSTALL 3-1/2" BATT INSULATION	S.F.	2283.0	$0.18	$414	1-CARP	0.007	$420	$834
6	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	2207.0	$0.20	$442	2-CARP	0.017	$1,971	$2,414
7	ISW	INSTALL 2"x4" STUDDED WALL 2' OC	L.F.	2041.0	$0.24	$481	F-2	0.009	$1,012	$1,493
8	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	2283.0	$0.07	$152	1-PORD	0.01	$551	$704
9	R4WMH	RELOCATE 4'-0" BASEBOARD RADIATION	EA.	3.0	$18.39	$55	Q-6	4.48	$1,176	$1,231
10	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	1.0	$8.82	$9	1-ELEC	0.844	$26	$35
11	REO	RELOCATE ELECTRICAL OUTLET	EA.	7.0	$7.97	$56	1-ELEC	0.896	$191	$247
12	RTS	RELOCATE TOILET STALL	EA.	1.0	$0.00	$0	2-CARP	3.536	$186	$186
13	RU	RELOCATE URINAL	EA	1.0	$77.75	$78	Q-1	13.487	$760	$838
14	RWC	RELOCATE WALL CABINET	EA.	3.0	$0.00	$0	1-CARP	1.7	$134	$134
15	RWTC	RELOCATE WATER CLOSET	EA.	1.0	$35.83	$36	Q-2	10.904	$956	$991
16	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	L.F.	312.0	$1.14	$357	1-CARP	0.134	$1,098	$1,456
17	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	76.0	$0.84	$64	2-CARP	0.02	$80	$144
18	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	76.0	$1.83	$139	2-TILE	0.084	$309	$448
19	RDR	RELOCATE DRAPERIES, WINDOW SHADES	EA.	21.0	$0.00	$0	L-2	0.744	$725	$725
20										
21										
22										
23										
24										
25										
26										
27		**SUBTOTAL**				$2,283			$9,594	$11,877
28	DIFF	DIFFICULTLY FACTOR			5%				$480	$480
29		**SUBTOTAL**				$2,283			$10,074	$12,357
30	OH	OVERHEAD			17%	$388			$1,713	$2,101
31		**SUBTOTAL**				$2,671			$11,787	$14,458
32	PRO	PROFIT			10%	$267			$1,179	$1,446
33		**SUBTOTAL**				$2,938			$12,965	$15,904
34	CONT	CONTINGENCY			20%	$588			$2,593	$3,181
35	**TOTAL COST**					$3,526			$15,559	$19,084

LIFE CYCLE COST ANALYSIS SUMMARY

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Leonard Wood	REGION: 2 (Missouri)		PROJECT NO:	1406-011
PROJECT TITLE:	Limited Energy Study, Insulate Brick Buildings			FISCAL YEAR:	1996
ANALYSIS DATE:	02/18/96	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz

1. INVESTMENT: **BLDG 638 - INSTALL 1.5" RIGID INSULATION ON WALLS**

A.	CONSTRUCTION COST	=	$19,324	
B.	SIOH COST	(7.0% of 1A) =	$1,353	
C.	DESIGN COST	(6.0% of 1A) =	$1,159	
D.	TOTAL COST	(1A +1B +1C) =	$21,836	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT	=	$0	
F.	PUBLIC UTILITY COMPANY REBATE	=	$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$21,836

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96

	ENERGY SOURCE	FUEL COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$7.33	5.56	$41	13.80	$562	
B.	DIST	$0.00	0	$0		$0	
C.	NAT GAS	$5.30	34.81	$184	17.76	$3,277	
D.	COAL	$0.00	0	$0		$0	
E.	ELEC. DEMAND			$0	13.47	$0	
F.	TOTAL		40.37	$225		------->	$3,839

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1	ANNUAL MAINTENANCE	$0	14.88	$0
2		$0	14.88	$0
3		$0	14.88	$0
4	TOTAL ANNUAL DISC. SAVINGS (+) / COST	$0		$0

B. NON-RECURRING (+/-)

	ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)
a.	BASELINE EQUIP. REPLCMNT.				$0
b.					$0
c.					$0
d.					$0
e.					$0
f.	TOTAL	$0			$0

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = $0

4.	FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-)	(2F3 + 3A4 + (3Bf1/Economic Life))	$225
5.	SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY)	(1G/4) =	96.95
6.	TOTAL NET DISCOUNTED SAVINGS	(2F5 + 3C) =	$3,839
7.	DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (MUST HAVE SIR > 1.25 TO QUALIFY)	(6/1G) =	0.18

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	SHEET 1 OF 1	
ENGINEER	E M C Engineers, Inc. Denver, CO	DATE PREPARED	18-Feb-96
		ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST Quantity	Unit Cost	Total	LABOR COST Crew/ Worker	Hours/ Unit	Total	TOTAL
1		**BUILDING 638**								
2		**INSTALL 1.5" RIGID INSULATION**								
3										
4										
5	I1-1/2RI	INSTALL 1-1/2" RIGID INSULATION	S.F.	2283.0	$0.59	$1,350	1-CARP	0.008	$480	$1,830
6	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	2207.0	$0.20	$442	2-CARP	0.017	$1,971	$2,414
7	IFS	INSTALL 3/4"x2" FURRING STRIPS	L.F.	1106.0	$0.19	$211	1-CARP	0.016	$465	$676
8	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	2283.0	$0.07	$152	1-PORD	0.01	$551	$704
9	R4WMH	RELOCATE 4'-0" BASEBOARD RADIATION	EA.	3.0	$18.39	$55	Q-6	4.48	$1,176	$1,231
10	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	1.0	$8.82	$9	1-ELEC	0.844	$26	$35
11	REO	RELOCATE ELECTRICAL OUTLET	EA.	7.0	$7.97	$56	1-ELEC	0.896	$191	$247
12	RTS	RELOCATE TOILET STALL	EA.	1.0	$0.00	$0	2-CARP	3.536	$186	$186
13	RU	RELOCATE URINAL	EA	1.0	$77.75	$78	Q-1	13.487	$760	$838
14	RWC	RELOCATE WALL CABINET	EA.	3.0	$0.00	$0	1-CARP	1.7	$134	$134
15	RWTC	RELOCATE WATER CLOSET	EA.	1.0	$35.83	$36	Q-2	10.904	$956	$991
16	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	L.F.	312.0	$1.14	$357	1-CARP	0.134	$1,098	$1,456
17	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	76.0	$0.84	$64	2-CARP	0.02	$80	$144
18	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	76.0	$1.83	$139	2-TILE	0.084	$309	$448
19	RDR	RELOCATE DRAPERIES, WINDOW SHADES	EA.	21.0	$0.00	$0	L-2	0.744	$725	$725
20										
21										
22										
23										
24										
25										
26										
27		**SUBTOTAL**				$2,950			$9,107	$12,057
28	DIFF	DIFFICULTLY FACTOR			5%				$455	$455
29		**SUBTOTAL**							$9,562	$12,512
30	OH	OVERHEAD			17%	$501			$1,626	$2,127
31		**SUBTOTAL**				$3,451			$11,188	$14,639
32	PRO	PROFIT			10%	$345			$1,119	$1,464
33		**SUBTOTAL**				$3,796			$12,307	$16,103
34	CONT	CONTINGENCY			20%	$759			$2,461	$3,221
35	**TOTAL COST**					$4,555			$14,768	$19,324

E M C ENGINEERS, INC.

DATE: Feb-96
BY: DMS
JOB: 1406.011
CHK: AJN
FILE: 638BHL

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT LEONARD WOOD, MO.

BUILDING HEATING LOAD CALCULATION SHEET

BLDG NO: 638 BLDG NAME: ADMINISTRATION
BLDG FUNCTION: ADMINISTRATION
FLOOR AREA: (SQ. FT) 3,327 # FLOORS 1
SLAB PERIMETER: (FT) 278

I. AREAS: ([ ] FIELD VERIFIED ELEVATION PLANS)

		NORTH	SOUTH	EAST	WEST	TOTAL
WALLS, GROSS	(SQ. FT)	480	323	1,206	878	2,886
GLASS	(SQ. FT)	66	33	220	193	512
PERSONNEL DOOR	(SQ. FT)	0	25	39	28	91
INSULATED PANEL	(SQ. FT)	0	0	0	0	0
WALLS, NET	(SQ. FT)	414	266	947	657	2,284
ROOF AREA (OR CEILING AREA IF ATTIC IS UNCONDITIONED)					(SQ. FT)	3,327
INSULATED PANEL	(SQ. FT)	0	PERSONNEL DOOR		(SQ. FT)	91
BASEMENT WALLS	(SQ. FT)	0	0	0	0	0

II. CONSTRUCTION: ([ ] FIELD VERIFIED WALL, ROOF, WINDOW, DOOR TYPES)

WALLS: (SKETCH CROSS SECTION OF WALL)

	COMPONENTS	R-VALUE
1.	OUTSIDE AIR FILM	0.17
2.	4" FACE BRICK	0.43
3.	AIR SPACE	0.91
4.	6" CMU	1.89
5.		
6.		
7.	INSIDE AIR FILM	0.68
	TOTAL R-WALL =	4.08
	U = 1/R	0.245

ROOF: (SKETCH CROSS SECTION OF ROOF)

	COMPONENTS	R-VALUE
1.	OUTSIDE AIR FILM	0.17
2.	BUILT UP ROOF	0.33
3.	STEEL DECK	0.00
4.	AIR SPACE	1.00
5.	6" BATT INSULATION	19.00
6.	ACOUSTIC TILE	1.35
7.	INSIDE AIR FILM	0.68
	TOTAL R-ROOF =	22.53
	U = 1/R	0.044

GLASS TYPE:	PPG 'PENNVERNON' C.L. TWNDV, SSA, .88 S.C.	R-GLASS	1.61
SLAB TYPE FLOOR:	CONCRETE	SLF	0.83
BASEMENT TYPE:	NONE	R-BASEM.	0.00
INSULATED PANEL:	NONE	R-PANEL	0.00
PERSONNEL DOOR TYPE:	METAL	R-PDOOR	2.56

III. INFILTRATION:

TIGHT WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
AVG. WALL H/M/L (SQ.FT.)	L	2886	X CFM / SQ.FT.	0.092	=	266
LEAKY WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
DOOR OPENINGS / HR - SINGLE DOOR		20	X CFM /OPENING /HR	1.600	=	32
DOOR OPENINGS / HR - DOUBLE DOORS		25	X CFM /OPENING /HR	1.385	=	35
			TOTAL INFILTRATION (CFM)		=	332

UA PANEL	PANEL AREA	0	X PANEL "U"	0.000	=	0
UA PDOOR	PDOOR AREA	91	X DOOR "U"	0.391	=	36
UA WALL	WALL AREA	2,284	X WALL "U"	0.245	=	559
UA ROOF	ROOF AREA	3,327	X ROOF "U"	0.044	=	148
UA GLASS	GLASS AREA	512	X GLASS "U"	0.621	=	318
UA SLAB	SLAB PERIM.	278	X SLF	0.830	=	231
UA BASEM.	B-WALL AREA	0	X BASE. "U"	0.000	=	0
INFILTRATION	CFM	332	X A. T. F.	1.035	=	344
			TOTAL UA (BTU/HR°F)			1,635

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY DMS
CHECKED BY: AJN
FILE: 638Z1
BLDG: 638 ZONE: 1

Rates of Heat Gain from Occupants of Conditioned Spaces

Zone No.	No. of People	Activity Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)
1	10	4	Seated, light work, typing	Offices, hotels, apts	250	200	2,500	2,000
TOTA	10					TOTAL	2,500	2,000

Peak Wattage Value for Lights

Zone No.	No. of Fixtures	Fixture Type	Description	Watts/Fixture	Total Wattage
1	19	2	Fluorescent, 2 - 40w lamps, 16w ballast (1x4 ft. fixture)	96	1,824
	19	19	Incandescent - 75w	75	1,425
	4	20	Incandescent - 100w	100	400
	2	28	Incandescent - 200w ES	200	400
	6	21	Incandescent - 150w	150	900
TOTA	50			TOTAL	4,949

Peak Value for Internal Gains

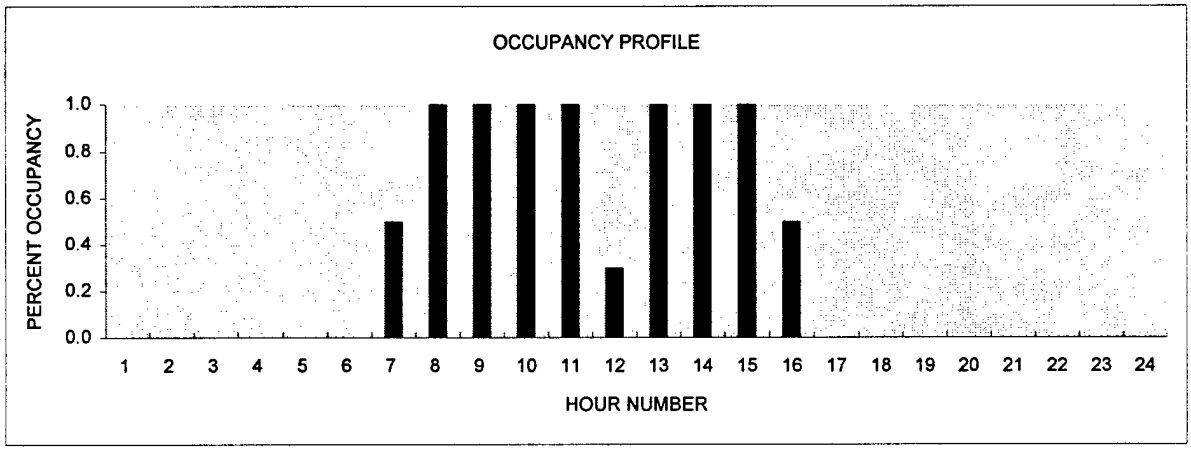
Zone No.	No. of Equipment	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattag	Total (BTU)
1	9	3	Microcomputer	350	91%	3,150	10,751
	10	5	Printer (laser)	870	34%	8,700	29,693
	1	10	Copiers (Large)	1,570	20%	1,570	5,358
	2	46	Microwave Oven	600	65%	1,200	4,096
	1	56	Refrigerator/Freezer(Frostless 14 cu. ft.)	615	35%	615	2,099
				TOTAL	47%	15,235	51,997

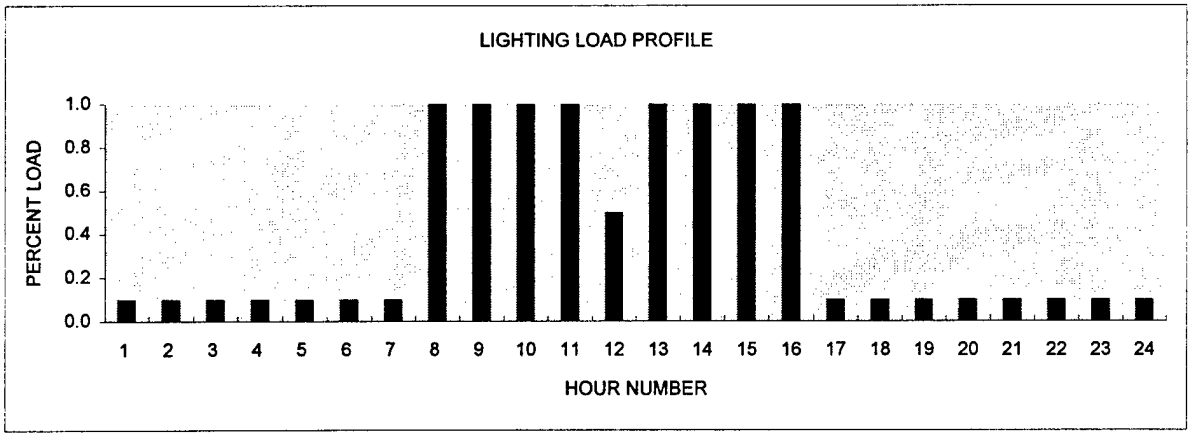
E M C Engineers, Inc.

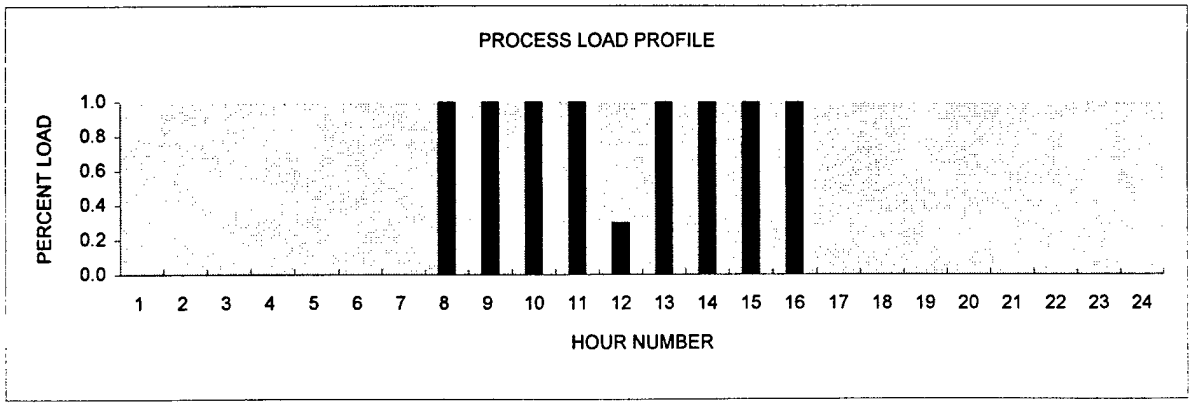
PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 638Z1
BLDG: 638
ZONE: 1

BLDG TYPE	BLDG FUNCTION	TYPE OF PROFILE	HOUR NUMBER																							
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
6	Gym	OCCUPANCY	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.0	1.0	1.0	1.0	0.3	1.0	1.0	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		LIGHTING	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.0	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		PROCESS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	0.3	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0







V:\1406.011\COLECTD\FIELD\PLE\638Z1.XLS

BLDG 638 - ADMINISTRATION BASELINE

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 6.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 26616.000000
FLOOR AREA (SQFT) 3327.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 179380.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -168000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 33270.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 332.000000
INFILTRATION PROFILE

.600	.600	.600	.600	.600	.600	.600	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	.600	.600	.600	.600	.600	.600	.600

A FACTOR IN INFILTRATION EQUATION (CINA) 2.090000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 6654.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 309.000000
PARTITION UA BTU/HR-F (GUA) 130.000000
DOOR UA BTU/HR-F (DUA) 36.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	265.8	657.0	414.0	947.0
WINDOW AREA SQFT (AWND)	33.0	192.5	66.0	220.0
WINDOW HEIGHT FT (WNDH)	5.5	5.5	5.5	5.5
WINDOW WIDTH FT (WNDW)	6.0	35.0	12.0	40.0
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.245	.245	.245
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01614	.01614	.01614	.01614
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00004	.00004	.00004	.00004
N=2	.00307	.00307	.00307	.00307
N=3	.00918	.00918	.00918	.00918
N=4	.00365	.00365	.00365	.00365
N=5	.00020	.00020	.00020	.00020
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.52669	-1.52669	-1.52669	-1.52669
N=3	.64703	.64703	.64703	.64703
N=4	-.05586	-.05586	-.05586	-.05586
N=5	.00128	.00128	.00128	.00128
N=6	********	********	********	********

ROOF AREA SQFT (AROF) 3327.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 4.400000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 2.340196E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .216E-05 .324E-04 .107E-03 .798E-04 .151E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.000000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	8.	6007.	2500.	2000.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.100	.000	.500	.500	70.0	76.0
8	1.000	1.000	1.000	1.000	70.0	76.0

```
  9        1.000     1.000     1.000     1.000        70.0        76.0
 10        1.000     1.000     1.000     1.000        70.0        76.0
 11        1.000     1.000     1.000     1.000        70.0        76.0
 12         .500      .300      .300      .300        70.0        76.0
 13        1.000     1.000     1.000     1.000        70.0        76.0
 14        1.000     1.000     1.000     1.000        70.0        76.0
 15        1.000     1.000     1.000     1.000        70.0        76.0
 16        1.000     1.000      .500      .500        70.0        76.0
 17         .100      .000      .000      .000        70.0        76.0
 18         .100      .000      .000      .000        70.0        76.0
 19         .100      .000      .000      .000        70.0        76.0
 20         .100      .000      .000      .000        70.0        76.0
 21         .100      .000      .000      .000        70.0        76.0
 22         .100      .000      .000      .000        70.0        76.0
 23         .100      .000      .000      .000        70.0        76.0
 24         .100      .000      .000      .000        70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)      65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)      65.000000
SYSTEM TYPE, (IECN)          2
SUPPLY AIR CFM (SACFM)    3720.000000
ECONOMIZER HIGH TEMP LIMIT F       68.000000
SYSTEM SUPPLY AIR START TIME HR    0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR       24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)      55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)    1.000000E-01
FAN EFFICIENCY (EFAN)    5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)    8.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  258960.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   310852.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)           3
COOLING PLANT RATED OUTPUT BTU (CFLOT)   120000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    31168.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 638 - ADMINISTRATION BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.23	.00	.00	.00	.00	.00	.00	.00
	-44.21	LOSS		-.76	-12.59	.00	-12.08	-7.13	-30.46	.00
FEB	.08	GAIN	9.42	.00	.00	.00	.00	.00	.00	.05
	-33.60	LOSS		-.64	-10.78	.00	-9.13	-6.13	-26.67	.00
MAR	1.91	GAIN	11.71	.00	.00	.00	.36	.00	.00	.33
	-27.13	LOSS		-.57	-10.07	.00	-7.22	-5.72	-25.49	.00
APR	9.40	GAIN	12.34	.00	.05	.00	1.52	.03	.11	.93
	-11.95	LOSS		-.32	-5.99	.00	-3.41	-3.40	-15.41	.00
MAY	20.11	GAIN	13.63	.02	.19	.00	3.14	.10	.36	3.35
	-3.72	LOSS		-.15	-3.32	.00	-1.11	-1.82	-9.58	.00
JUN	37.53	GAIN	13.51	.06	.56	.00	4.88	.31	1.10	11.37
	-.39	LOSS		-.05	-1.48	.00	-.20	-.81	-3.14	.00
JUL	48.73	GAIN	13.88	.12	1.43	.00	6.47	.81	2.89	15.19
	-.12	LOSS		-.03	-.93	.00	-.09	-.51	-2.07	.00
AUG	43.96	GAIN	12.34	.09	1.08	.00	5.34	.60	2.09	14.31
	-.30	LOSS		-.03	-1.04	.00	-.13	-.57	-2.00	.00
SEP	26.12	GAIN	10.52	.03	.54	.00	2.91	.31	1.15	7.94
	-4.05	LOSS		-.14	-2.65	.00	-1.12	-1.48	-6.88	.00
OCT	7.45	GAIN	8.64	.00	.08	.00	.70	.04	.16	1.59
	-11.80	LOSS		-.35	-5.63	.00	-3.86	-3.12	-14.18	.00
NOV	2.04	GAIN	6.77	.00	.00	.00	.11	.00	.00	.41
	-22.99	LOSS		-.51	-8.14	.00	-7.07	-4.52	-19.18	.00
DEC	.09	GAIN	6.24	.00	.00	.00	.00	.00	.00	.00
	-43.54	LOSS		-.76	-12.34	.00	-12.21	-6.92	-28.75	.00
TOT	197.	GAIN	126.	0.	4.	0.	25.	2.	8.	55.
	-204.	LOSS		-4.	-75.	0.	-58.	-42.	-184.	0.

MAX HEATING LOAD= -165538. BTUH ON DEC 18 HOUR 7 AMBIENT TEMP -1.
MAX COOLING LOAD= 163599. BTUH ON JUL 27 HOUR 15 AMBIENT TEMP 92.

ZONE UA BTU/HR-F 1059.0

BLDG 638 - ADMINISTRATION BASELINE

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL INTERNAL HEAT GAIN MILLION BTU
JAN	70.	77.		5	15	64.	2.35	3.47	1.61	11.58
			68.	27	6	4.				
FEB	71.	78.		26	13	59.	2.09	3.09	1.46	10.35
			68.	2	6	14.				
MAR	71.	79.		9	16	64.	2.31	3.42	1.61	11.44
			68.	4	6	15.				
APR	73.	79.		16	11	63.	2.23	3.29	1.56	11.03
			69.	9	5	30.				
MAY	75.	81.		11	13	63.	2.35	3.47	1.61	11.58
			69.	11	5	39.				
JUN	76.	79.		12	14	85.	2.23	3.29	1.56	11.03
			69.	10	5	66.				
JUL	77.	79.		26	13	93.	2.31	3.42	1.61	11.44
			70.	10	5	57.				
AUG	76.	79.		30	14	87.	2.35	3.47	1.61	11.58
			70.	25	6	51.				
SEP	75.	80.		28	13	63.	2.19	3.24	1.56	10.89
			69.	15	6	39.				
OCT	73.	79.		17	13	64.	2.35	3.47	1.61	11.58
			69.	28	5	31.				
NOV	71.	78.		8	13	77.	2.26	3.34	1.56	11.17
			69.	3	7	18.				
DEC	70.	77.		12	14	61.	2.28	3.37	1.61	11.30
			68.	18	7	-1.				
YEAR							27.29	40.31	18.99	134.98

BLDG 638 - ADMINISTRATION BASELINE

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	669	33	0	0	-.1565E+06	.0000
FEB	543	64	0	0	-.1292E+06	.4277E+05
MAR	516	124	0	0	-.1290E+06	.8590E+05
APR	318	257	0	0	-.8244E+05	.1001E+06
MAY	194	372	0	0	-.5767E+05	.1211E+06
JUN	42	487	0	0	-.2035E+05	.1542E+06
JUL	19	603	0	0	-.1607E+05	.1636E+06
AUG	27	584	0	0	-.2766E+05	.1486E+06
SEP	150	404	0	0	-.5694E+05	.1561E+06
OCT	350	236	0	0	-.7872E+05	.1204E+06
NOV	504	108	0	0	-.1128E+06	.8818E+05
DEC	675	20	0	0	-.1655E+06	.3514E+05
YEAR	4007	3292	0	0	-.1655E+06	.1636E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
MONTH	HEATING MILLION BTU	COOLING THOUSAND KWH	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FANS THOUSAND KWH	HEAT GAIN MILLION BTU	ELECTRIC DEMAND KW
JAN	69.32	.00	2.35	3.47	.47	11.58	9.1
FEB	54.08	.01	2.09	3.09	.43	10.35	13.4
MAR	46.79	.18	2.31	3.42	.47	11.44	16.3
APR	24.43	.85	2.23	3.29	.46	11.03	17.1
MAY	12.24	1.74	2.35	3.47	.47	11.58	18.2
JUN	2.49	3.09	2.23	3.29	.46	11.03	18.2
JUL	1.13	4.02	2.31	3.42	.47	11.44	18.2
AUG	1.60	3.69	2.35	3.47	.47	11.58	18.2
SEP	9.84	2.21	2.19	3.24	.46	10.89	18.2
OCT	25.40	.67	2.35	3.47	.47	11.58	18.2
NOV	42.44	.20	2.26	3.34	.46	11.17	16.4
DEC	69.14	.01	2.28	3.37	.47	11.30	9.4
YEAR	358.89	16.67	27.29	40.31	5.56	134.98	18.2

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 170793. BTU/(SQFT-YEAR)

BLDG 638 - ADMINISTRATION BASELINE

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.1565E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.4277E+05	-.1292E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.8590E+05	-.1290E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1001E+06	-.8244E+05
MAY	2566.	1826.	1.000	65.	0.	0.	3	0	.1200E+06	-.5767E+05
JUN	2647.	1993.	1.000	72.	27.	0.	128	0	.1200E+06	-.2035E+05
JUL	2546.	2015.	1.000	77.	35.	0.	209	0	.1200E+06	-.1607E+05
AUG	2280.	1840.	1.000	76.	22.	0.	148	0	.1200E+06	-.2766E+05
SEP	1856.	1371.	1.000	68.	23.	0.	84	0	.1200E+06	-.5694E+05
OCT	1437.	953.	1.000	57.	0.	0.	1	0	.1200E+06	-.7872E+05
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.8818E+05	-.1128E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.3514E+05	-.1655E+06

BLDG 638 - ADMINISTRATION - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 6.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 26616.000000
FLOOR AREA (SQFT) 3327.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 179380.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -168000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 33270.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 332.000000
INFILTRATION PROFILE

.600	.600	.600	.600	.600	.600	.600	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	.600	.600	.600	.600	.600	.600	.600

A FACTOR IN INFILTRATION EQUATION (CINA) 2.090000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 6654.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 309.000000
PARTITION UA BTU/HR-F (GUA) 130.000000
DOOR UA BTU/HR-F (DUA) 36.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	265.8	657.0	414.0	947.0
WINDOW AREA SQFT (AWND)	33.0	192.5	66.0	220.0
WINDOW HEIGHT FT (WNDH)	5.5	5.5	5.5	5.5
WINDOW WIDTH FT (WNDW)	6.0	35.0	12.0	40.0
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.064	.064	.064	.064
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00176	.00176	.00176	.00176
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00016	.00016	.00016	.00016
N=3	.00086	.00086	.00086	.00086
N=4	.00066	.00066	.00066	.00066
N=5	.00008	.00008	.00008	.00008
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	-.16643	-.16643	-.16643	-.16643
N=5	.00728	.00728	.00728	.00728
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 3327.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 4.400000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 2.340196E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .216E-05 .324E-04 .107E-03 .798E-04 .151E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.000000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	BTU/HR			THERMOSTAT SET POINT DEG F	
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	8.	6007.	2500.	2000.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.100	.000	.500	.500	70.0	76.0
8	1.000	1.000	1.000	1.000	70.0	76.0

```
  9        1.000     1.000     1.000     1.000        70.0        76.0
 10        1.000     1.000     1.000     1.000        70.0        76.0
 11        1.000     1.000     1.000     1.000        70.0        76.0
 12         .500      .300      .300      .300        70.0        76.0
 13        1.000     1.000     1.000     1.000        70.0        76.0
 14        1.000     1.000     1.000     1.000        70.0        76.0
 15        1.000     1.000     1.000     1.000        70.0        76.0
 16        1.000     1.000      .500      .500        70.0        76.0
 17         .100      .000      .000      .000        70.0        76.0
 18         .100      .000      .000      .000        70.0        76.0
 19         .100      .000      .000      .000        70.0        76.0
 20         .100      .000      .000      .000        70.0        76.0
 21         .100      .000      .000      .000        70.0        76.0
 22         .100      .000      .000      .000        70.0        76.0
 23         .100      .000      .000      .000        70.0        76.0
 24         .100      .000      .000      .000        70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)    3720.000000
ECONOMIZER HIGH TEMP LIMIT F        68.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  258960.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   310852.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)             3
COOLING PLANT RATED OUTPUT BTU (CFLOT)   120000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    31168.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 638 - ADMINISTRATION - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.23	.00	.00	.00	.00	.00	.00	.00
	-35.96	LOSS		-.77	-12.67	.00	-3.14	-7.18	-31.01	.00
FEB	.09	GAIN	9.42	.00	.00	.00	.00	.00	.00	.05
	-27.97	LOSS		-.64	-10.86	.00	-2.41	-6.17	-27.62	.00
MAR	1.89	GAIN	11.71	.00	.00	.00	.02	.00	.00	.32
	-23.18	LOSS		-.57	-10.14	.00	-1.82	-5.76	-26.49	.00
APR	8.92	GAIN	12.34	.00	.05	.00	.24	.03	.11	.89
	-10.81	LOSS		-.32	-5.97	.00	-.77	-3.40	-16.10	.00
MAY	18.85	GAIN	13.63	.03	.19	.00	.70	.10	.36	3.24
	-3.71	LOSS		-.14	-3.19	.00	-.13	-1.75	-9.45	.00
JUN	33.96	GAIN	13.51	.06	.56	.00	1.26	.31	1.11	10.44
	-.48	LOSS		-.04	-1.33	.00	.00	-.73	-2.70	.00
JUL	43.15	GAIN	13.88	.12	1.44	.00	1.68	.81	2.90	14.02
	-.15	LOSS		-.02	-.86	.00	.00	-.48	-1.93	.00
AUG	38.96	GAIN	12.34	.09	1.08	.00	1.39	.60	2.10	12.87
	-.32	LOSS		-.03	-.98	.00	.00	-.53	-1.88	.00
SEP	23.82	GAIN	10.52	.03	.54	.00	.69	.31	1.15	7.15
	-3.80	LOSS		-.13	-2.58	.00	-.18	-1.45	-6.95	.00
OCT	7.30	GAIN	8.64	.00	.08	.00	.11	.04	.16	1.52
	-10.29	LOSS		-.35	-5.64	.00	-.92	-3.13	-15.08	.00
NOV	2.16	GAIN	6.77	.00	.00	.00	.01	.00	.00	.43
	-18.93	LOSS		-.51	-8.22	.00	-1.83	-4.56	-20.04	.00
DEC	.12	GAIN	6.24	.00	.00	.00	.00	.00	.00	.00
	-35.21	LOSS		-.77	-12.44	.00	-3.21	-6.97	-29.24	.00
TOT	179.	GAIN	126.	0.	4.	0.	6.	2.	8.	51.
	-171.	LOSS		-4.	-75.	0.	-14.	-42.	-188.	0.

MAX HEATING LOAD= -138460. BTUH ON DEC 18 HOUR 7 AMBIENT TEMP -1.
MAX COOLING LOAD= 154225. BTUH ON SEP 3 HOUR 11 AMBIENT TEMP 90.

ZONE UA BTU/HR-F 645.7

BLDG 638 - ADMINISTRATION - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL INTERNAL HEAT GAIN MILLION BTU
JAN	70.	78.		4	13	64.	2.35	3.47	1.61	11.58
			69.	27	6	4.				
FEB	71.	78.		26	13	59.	2.09	3.09	1.46	10.35
			69.	6	6	14.				
MAR	72.	80.		27	11	62.	2.31	3.42	1.61	11.44
			69.	3	6	15.				
APR	73.	80.		16	11	63.	2.23	3.29	1.56	11.03
			69.	14	5	30.				
MAY	74.	82.		11	13	63.	2.35	3.47	1.61	11.58
			69.	11	4	38.				
JUN	76.	79.		27	13	88.	2.23	3.29	1.56	11.03
			70.	10	5	66.				
JUL	76.	79.		3	11	85.	2.31	3.42	1.61	11.44
			70.	10	5	57.				
AUG	76.	79.		1	14	82.	2.35	3.47	1.61	11.58
			70.	25	6	51.				
SEP	75.	81.		25	11	62.	2.19	3.24	1.56	10.89
			69.	15	6	39.				
OCT	73.	81.		12	11	64.	2.35	3.47	1.61	11.58
			69.	28	4	30.				
NOV	72.	79.		7	10	64.	2.26	3.34	1.56	11.17
			69.	3	4	17.				
DEC	70.	77.		12	14	61.	2.28	3.37	1.61	11.30
			69.	18	6	0.				
YEAR							27.29	40.31	18.99	134.98

BLDG 638 - ADMINISTRATION - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	639	43	0	0	-.1350E+06	.0000
FEB	515	87	0	0	-.1099E+06	.4541E+05
MAR	496	147	0	0	-.1110E+06	.8542E+05
APR	329	258	0	0	-.7031E+05	.9857E+05
MAY	232	330	0	0	-.4928E+05	.1198E+06
JUN	61	410	0	0	-.1837E+05	.1447E+06
JUL	28	539	0	0	-.1392E+05	.1537E+06
AUG	32	508	0	0	-.2412E+05	.1436E+06
SEP	158	361	0	0	-.4820E+05	.1542E+06
OCT	347	238	0	0	-.6811E+05	.1173E+06
NOV	475	125	0	0	-.9461E+05	.8890E+05
DEC	629	36	0	0	-.1385E+06	.4256E+05
YEAR	3941	3082	0	0	-.1385E+06	.1542E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	60.36	.00	2.35	3.47	.47	11.58	9.1
FEB	47.53	.01	2.09	3.09	.43	10.35	13.6
MAR	42.18	.18	2.31	3.42	.47	11.44	16.3
APR	23.83	.81	2.23	3.29	.46	11.03	17.0
MAY	14.28	1.64	2.35	3.47	.47	11.58	18.2
JUN	3.61	2.80	2.23	3.29	.46	11.03	18.2
JUL	1.66	3.56	2.31	3.42	.47	11.44	18.2
AUG	1.89	3.26	2.35	3.47	.47	11.58	18.2
SEP	9.95	2.00	2.19	3.24	.46	10.89	18.2
OCT	23.85	.65	2.35	3.47	.47	11.58	18.1
NOV	37.56	.21	2.26	3.34	.46	11.17	16.5
DEC	59.07	.01	2.28	3.37	.47	11.30	10.0
YEAR	325.76	15.13	27.29	40.31	5.56	134.98	18.2

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 159257. BTU/(SQFT-YEAR)

BLDG 638 - ADMINISTRATION - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	-	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.1350E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.4541E+05	-.1099E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.8542E+05	-.1110E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.9857E+05	-.7031E+05
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1198E+06	-.4928E+05
JUN	2647.	1993.	1.000	72.	20.	0.	98	0	.1200E+06	-.1837E+05
JUL	2546.	2015.	1.000	77.	26.	0.	171	0	.1200E+06	-.1392E+05
AUG	2280.	1840.	1.000	76.	17.	0.	124	0	.1200E+06	-.2412E+05
SEP	1856.	1371.	1.000	68.	17.	0.	70	0	.1200E+06	-.4820E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1173E+06	-.6811E+05
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.8890E+05	-.9461E+05
DEC	883.	604.	1.000	35.	0.	0.	0	0	.4256E+05	-.1385E+06

BLDG 638 - ADMINISTRATION - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 6.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 26616.000000
FLOOR AREA (SQFT) 3327.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 179380.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -168000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 33270.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 332.000000
INFILTRATION PROFILE

.600	.600	.600	.600	.600	.600	.600	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	.600	.600	.600	.600	.600	.600	.600

A FACTOR IN INFILTRATION EQUATION (CINA) 2.090000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 6654.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 309.000000
PARTITION UA BTU/HR-F (GUA) 130.000000
DOOR UA BTU/HR-F (DUA) 36.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	265.8	657.0	414.0	947.0
WINDOW AREA SQFT (AWND)	33.0	192.5	66.0	220.0
WINDOW HEIGHT FT (WNDH)	5.5	5.5	5.5	5.5
WINDOW WIDTH FT (WNDW)	6.0	35.0	12.0	40.0
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.055	.055	.055	.055
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00174	.00174	.00174	.00174
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00019	.00019	.00019	.00019
N=3	.00089	.00089	.00089	.00089
N=4	.00059	.00059	.00059	.00059
N=5	.00007	.00007	.00007	.00007
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	-.14508	-.14508	-.14508	-.14508
N=5	.00613	.00613	.00613	.00613
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 3327.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 4.400000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 2.340196E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .216E-05 .324E-04 .107E-03 .798E-04 .151E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.000000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	8.	6007.	2500.	2000.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.100	.000	.500	.500	70.0	76.0
8	1.000	1.000	1.000	1.000	70.0	76.0

```
  9        1.000     1.000     1.000     1.000        70.0        76.0
 10        1.000     1.000     1.000     1.000        70.0        76.0
 11        1.000     1.000     1.000     1.000        70.0        76.0
 12         .500      .300      .300      .300        70.0        76.0
 13        1.000     1.000     1.000     1.000        70.0        76.0
 14        1.000     1.000     1.000     1.000        70.0        76.0
 15        1.000     1.000     1.000     1.000        70.0        76.0
 16        1.000     1.000      .500      .500        70.0        76.0
 17         .100      .000      .000      .000        70.0        76.0
 18         .100      .000      .000      .000        70.0        76.0
 19         .100      .000      .000      .000        70.0        76.0
 20         .100      .000      .000      .000        70.0        76.0
 21         .100      .000      .000      .000        70.0        76.0
 22         .100      .000      .000      .000        70.0        76.0
 23         .100      .000      .000      .000        70.0        76.0
 24         .100      .000      .000      .000        70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)      65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)      65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)    3720.000000
ECONOMIZER HIGH TEMP LIMIT F       68.000000
SYSTEM SUPPLY AIR START TIME HR    0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR       24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)      55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)    1.000000E-01
FAN EFFICIENCY (EFAN)    5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)    8.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  258960.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   310852.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)           3
COOLING PLANT RATED OUTPUT BTU (CFLOT)   120000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    31168.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 638 - ADMINISTRATION - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.23	.00	.00	.00	.00	.00	.00	.00
	-35.56	LOSS		-.77	-12.68	.00	-2.71	-7.18	-31.04	.00
FEB	.09	GAIN	9.42	.00	.00	.00	.00	.00	.00	.05
	-27.69	LOSS		-.64	-10.86	.00	-2.07	-6.18	-27.68	.00
MAR	1.90	GAIN	11.71	.00	.00	.00	.02	.00	.00	.32
	-23.00	LOSS		-.57	-10.15	.00	-1.57	-5.76	-26.54	.00
APR	8.93	GAIN	12.34	.00	.05	.00	.22	.03	.11	.89
	-10.77	LOSS		-.32	-5.97	.00	-.67	-3.40	-16.14	.00
MAY	18.80	GAIN	13.63	.03	.19	.00	.61	.10	.36	3.23
	-3.74	LOSS		-.14	-3.18	.00	-.12	-1.75	-9.44	.00
JUN	33.72	GAIN	13.51	.06	.56	.00	1.09	.31	1.11	10.31
	-.50	LOSS		-.04	-1.32	.00	.00	-.72	-2.67	.00
JUL	42.89	GAIN	13.88	.12	1.44	.00	1.45	.81	2.90	13.95
	-.16	LOSS		-.02	-.85	.00	.00	-.47	-1.91	.00
AUG	38.72	GAIN	12.34	.09	1.08	.00	1.19	.60	2.10	12.77
	-.33	LOSS		-.03	-.97	.00	.00	-.53	-1.86	.00
SEP	23.61	GAIN	10.52	.03	.54	.00	.60	.31	1.15	7.01
	-3.80	LOSS		-.13	-2.58	.00	-.16	-1.44	-6.95	.00
OCT	7.31	GAIN	8.64	.00	.08	.00	.10	.04	.16	1.52
	-10.23	LOSS		-.35	-5.64	.00	-.80	-3.13	-15.12	.00
NOV	2.18	GAIN	6.77	.00	.00	.00	.01	.00	.00	.43
	-18.75	LOSS		-.51	-8.23	.00	-1.57	-4.57	-20.09	.00
DEC	.12	GAIN	6.24	.00	.00	.00	.00	.00	.00	.00
	-34.82	LOSS		-.77	-12.45	.00	-2.76	-6.97	-29.28	.00
TOT	178.	GAIN	126.	0.	4.	0.	5.	2.	8.	50.
	-169.	LOSS		-4.	-75.	0.	-12.	-42.	-189.	0.

MAX HEATING LOAD= -137532. BTUH ON DEC 18 HOUR 7 AMBIENT TEMP -1.
MAX COOLING LOAD= 153979. BTUH ON SEP 3 HOUR 11 AMBIENT TEMP 90.

ZONE UA BTU/HR-F 625.1

BLDG 638 - ADMINISTRATION - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL INTERNAL HEAT GAIN MILLION BTU
JAN	70.	78.		4	13	64.	2.35	3.47	1.61	11.58
			69.	27	6	4.				
FEB	71.	78.		26	13	59.	2.09	3.09	1.46	10.35
			69.	6	6	14.				
MAR	72.	80.		27	11	62.	2.31	3.42	1.61	11.44
			69.	3	6	15.				
APR	73.	80.		16	11	63.	2.23	3.29	1.56	11.03
			69.	14	5	30.				
MAY	74.	82.		11	13	63.	2.35	3.47	1.61	11.58
			69.	11	4	38.				
JUN	76.	79.		27	13	88.	2.23	3.29	1.56	11.03
			70.	10	5	66.				
JUL	76.	79.		3	11	85.	2.31	3.42	1.61	11.44
			70.	10	5	57.				
AUG	76.	79.		1	14	82.	2.35	3.47	1.61	11.58
			70.	25	6	51.				
SEP	75.	81.		25	11	62.	2.19	3.24	1.56	10.89
			69.	15	6	39.				
OCT	73.	81.		12	11	64.	2.35	3.47	1.61	11.58
			69.	28	4	30.				
NOV	72.	79.		7	10	64.	2.26	3.34	1.56	11.17
			69.	3	4	17.				
DEC	70.	78.		12	14	61.	2.28	3.37	1.61	11.30
			69.	18	6	0.				
YEAR							27.29	40.31	18.99	134.98

BLDG 638 - ADMINISTRATION - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	638	44	0	0	-.1343E+06	.0000
FEB	511	89	0	0	-.1092E+06	.4588E+05
MAR	494	148	0	0	-.1104E+06	.8552E+05
APR	329	258	0	0	-.6997E+05	.9850E+05
MAY	232	329	0	0	-.4921E+05	.1196E+06
JUN	64	404	0	0	-.1859E+05	.1444E+06
JUL	28	535	0	0	-.1415E+05	.1535E+06
AUG	33	504	0	0	-.2429E+05	.1434E+06
SEP	158	354	0	0	-.4804E+05	.1540E+06
OCT	347	239	0	0	-.6779E+05	.1173E+06
NOV	473	126	0	0	-.9398E+05	.8899E+05
DEC	627	37	0	0	-.1375E+06	.4302E+05
YEAR	3934	3067	0	0	-.1375E+06	.1540E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	59.97	.00	2.35	3.47	.47	11.58	9.1
FEB	47.07	.01	2.09	3.09	.43	10.35	13.7
MAR	41.92	.18	2.31	3.42	.47	11.44	16.3
APR	23.78	.81	2.23	3.29	.46	11.03	17.0
MAY	14.28	1.63	2.35	3.47	.47	11.58	18.2
JUN	3.79	2.77	2.23	3.29	.46	11.03	18.2
JUL	1.66	3.54	2.31	3.42	.47	11.44	18.2
AUG	1.95	3.24	2.35	3.47	.47	11.58	18.2
SEP	9.94	1.98	2.19	3.24	.46	10.89	18.2
OCT	23.80	.65	2.35	3.47	.47	11.58	18.1
NOV	37.30	.21	2.26	3.34	.46	11.17	16.5
DEC	58.60	.01	2.28	3.37	.47	11.30	10.1
YEAR	324.08	15.04	27.29	40.31	5.56	134.98	18.2

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 158658. BTU/(SQFT-YEAR)

BLDG 638 - ADMINISTRATION - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.1343E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.4588E+05	-.1092E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.8552E+05	-.1104E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.9850E+05	-.6997E+05
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1196E+06	-.4921E+05
JUN	2647.	1993.	1.000	72.	20.	0.	95	0	.1200E+06	-.1859E+05
JUL	2546.	2015.	1.000	77.	26.	0.	167	0	.1200E+06	-.1415E+05
AUG	2280.	1840.	1.000	76.	16.	0.	123	0	.1200E+06	-.2429E+05
SEP	1856.	1371.	1.000	68.	16.	0.	68	0	.1200E+06	-.4804E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1173E+06	-.6779E+05
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.8899E+05	-.9398E+05
DEC	883.	604.	1.000	35.	0.	0.	0	0	.4302E+05	-.1375E+06

BUILDING MANAGER INTERVIEW

BUILDING INFORMATION:							
Building No:	638	Building Name:	Adminstration				
Surveyed by:	DMS	Date:	11/6/95	Building Use:	Administration		
Building Contact:				Phone No:			
Building Contact:				Phone No:			
OCCUPANCY:							
Number of Employees:	Mon./Fri.:	10	Schedule:	730	To	1630	
	Tues./Thurs	10		730	To	1630	
	Wed.	10		730	To	1630	
	Sat./Sun.				To		
Visitors Per Day:	Mon./Fri.:		Schedule:		To		
	Tues./Thurs.				To		
	Wed.				To		
	Sat./Sun.				To		
Comments:							
LIGHTING SCHEDULE:							
Normal Occupancy:	Mon.-Fri.:		Schedule:	730	To	1630	
	Sat./Sun.:			730	To	1630	
Cleaning Crew/2nd Shift:	Mon.-Fri.:		Schedule:		To		
	Sat./Sun.:				To		
EQUIPMENT SCHEDULE:							
Fan/AHU Schedule:	Mon.-Fri.:		Schedule:	0	To	2400	
	Sat./Sun.:			0	To	2400	
Chiller Schedule:	Mon.-Fri.:		Schedule:	0	To	2400	
	Sat./Sun.:			0	To	2400	
Boiler Schedule:	Mon.-Fri.:		Schedule:	0	To	2400	
	Sat./Sun.:			0	To	2400	
Aux. Equipment Schedule:							
	Mon.-Fri.:		Schedule:	0	To	2400	
	Sat./Sun.:			0	To	2400	
	Mon.-Fri.:		Schedule:		To		
	Sat./Sun.:				To		
Comments:							

Building No 638 **Building Name:** Administration

BUILDING ENVELOPE

EXTERIOR WALLS

Wall Direction (N, E, W, or S)	Wall Construction No.	Comments
N	XW-4	
E	XW-4	
S	XW-4	
W	XW-4	

LIST OF EXT. WALL CONSTRUCTION TYPES

Wall Construction No.	Description
XW-1	Face Brick & CMU
XW-2	Face Brick, CMU, & Gyp. Board
XW-3	Face Brick, CMU, & Ceramic Tile
XW-4	Face Brick, CMU, & Plaster Board

WINDOWS

Window Direction (N, E, W, or S)	Window Construction No.	Comments
N	W-1	
E	W-1	
S	W-1	
W	W-1	
		General: Insulated metal panel on top
		portion of windows

LIST OF WINDOW TYPES

Window Construction No.	Description
W-1	Double Pane Clear
W-2	Double Pane Tinted
W-3	Single Pane with Storm Windows
W-4	Single Pane

ROOF CONSTRUCTION

Roof Location	Roof Construction No.	Comments
ALL	R-2	
		GENERAL: Plaster ceiling in office areas; Acoustic ceiling tiles in waiting area and hallways only.

LIST OF ROOF CONSTRUCTION TYPES

Roof Construction No.	Description
R-1	BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile
R-2	BUR, Metal Deck, Air Space, 6" Batt Insul., Ceiling Tile/Plaster
R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Clg.
R-4	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plaster Clg.
R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceiling Tile
R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaster Clg.

Building No 638 **Building Name:** Administration

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

INTERIOR EQUIPMENT AND OBJECTS				LIST OF EQUIPMENT AND OBJECTS	
Wall Direction (N, E, W, or S)	Item No.	No. of Items	Comments	Item No.	Description
					Architectural
				A-1	Interior Partitions
N	E-2	3	Glazed structural block 5'-0" AFF Approximate	A-2	Wall Placards
N	A-4	10	area 25'x5'	A-3	Drapery Valances
				A-4	Drapery Rods, Venician Blinds
				A-5	Cabinets
E	M-3	3			
E	A-4	1			**Plumbing**
				P-1	Sinks
S	E-2	4	Glazed structural block 5'-0" AFF in latrine.	P-2	Commodes
S	E-3	1		P-3	Toilet Stalls
S	A-5	3		P-4	Water Fountains
S	P-2	1		P-5	Urinal
S	P-5	1			
S	P-3	1			**HVAC Mechanical**
S	A-4	7		M-1	Floor Supply/Return Grilles
				M-2	Ceiling Supply/Return Grilles
W	A-4	3		M-3	Finned-Tube Baseboard Radiators
				M-4	Thermostats / Space Temp. Sensors
				M-5	Wall mounted convection type heater
				M-6	1/2" Hot & Cold Water Piping
					Electrical
				E-1	Electrical Panels
				E-2	Electrical Outlets
				E-3	Electrical Light Switches
				E-4	Wall Mounted Television
					Lighting
				L-1	Wall Mounted Fixtures
				L-2	Ceiling Mounted Fixtures
				L-3	Exit Signs
					Fire Protection
				F-1	Alarm Pull Switches
				F-2	Alarm Sound Devices (Speakers, Bells)
				F-3	Sprinkler Heads
				F-4	Fire Extinguishes
					Communication
				C-1	Telephones - Wall Mounted
				C-2	Telephones - Booth Mounted
				C-3	Telephone Jacks

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE: **638AH1**

BLDG: **638**

AIR HANDLING UNIT SURVEY OBSERVATIONS

AHU-1	AHU NO.	**MECH. ROOM**	LOCATION (RM)
DX-1	REF. SYS. SERVING AHU	**ALL**	SERVES AREA

UNIT TYPE:

	SINGLE ZN		2-PIPE FC		4-PIPE FC		UNIT HTR		H&V
X	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION		VAV
3	NUMBER OF ZONES				OTHER				
	COMMENT:								

NAMEPLATE:

DUNHAM-BUSH					MFG.	**MZ-32-I**			MODEL
3.0	SUPPLY FAN HP	**WESTINGHOUSE**			MFG.	**ABDP**			MODEL
	RET/EXH FAN HP				MFG.				MODEL
3720	CFM-HTG	3720	CFM-CLG	10%	MIN %OA	100%	MAX %OA	100%	% HTG AREA SERVED
COMMENT:									

COILS:

X	NONE		STM		HW		ELEC		MOD VLV	PREHEAT
	NONE	X	STM		HW		ELEC	X	MOD VLV	HEATING
X	NONE		STM		HW		ELEC		MOD VLV	REHEAT
X	NONE		STM		HW		ELEC		MOD VLV	HUMID.
	NONE	X	DX		CW			X	MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	500	500	500	500	500	500	500	TIMECLOCK?
PRESENT STOP TIME	1200	1700	1700	1700	1700	1700	1500	YES
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:											
J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	1	1	1	1	1	1	1	1

CONTROLS:

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:	X	SINGLE STPT		DUAL SETPNT		SETBACK			
SPACE SETPOINT (oF):	70	OCC HEAT		UNOCC HEAT	78	OCC COOL		UNOCC COOL	
OTHER SETPOINTS (oF):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Y	MAX OA (Y/N)	Y	RA (Y/N)	Y	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:	Y	YES		NO					
COMMENTS:	**CONTROLS ARE IN GOOD CONDITION**								

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD
BLDG: **638**

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE: **638CH1**

REFRIGERATION EQUIPMENT SURVEY OBSERVATIONS

DX-1	CHILLER/COMPRESSOR NO.	OUTSIDE BLDG	LOCATION (RM)

UNIT TYPE:

	CENTRIFUGAL WITH WATER SIDE COOLING TOWER						OTHER	
	RECIPROCATING WITH WATER SIDE COOLING TOWER					X	AHU'S SERVED	**AHU-1** **(ZN1)**
	RECIPROCATING WITH AIR COOLED CONDENSING UNIT							
	ABSORBTION WITH WATER SIDE COOLING TOWER							
X	AIR COOLED CONDENSING UNIT							
	CHW	X	DX		OTHER			

NAMEPLATE:

CHILLER	**WEBSTER**	MFG.	**A20A**			MODEL	**51039**			SERIAL NO.
208	VOLTS	**62**	AMPS	**3**	PH	**60**	HZ	**10**	CAPACITY (TONS)	
CONDENSER FANS		MFG.				MODEL			**1**	# OF FANS
208	VOLTS	**7.5**	AMPS	**3**	PH	**60**	HZ	**2**	HP	
DTW PUMP		MFG.				MODEL				SERIAL NO.
	VOLTS		AMPS		PH		HZ		HP	
CNW PUMP		MFG.				MODEL				SERIAL NO.
	VOLTS		AMPS		PH		HZ		HP	
COMMENTS:										

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	**0**	**0**	**0**	**0**	**0**	**0**	**0**	TIMECLOCK?
PRESENT STOP TIME	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**NO TIMECLOCK**
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
0	**0**	**0**	**0**	**1**	**1**	**1**	**1**	**1**	**0**	**0**	**0**

CONTROLS:

		PNEUMATIC	X	ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		CWS (oF)		CWR (oF)		CNWS (oF)		CNWR (oF)	
PANEL INDICATORS									
- PRESSURE		LITE-HI		LITE-LOW		GAUGES			
- TEMPERATURE		LITE-HI		LITE-LOW		GAUGES			
- OTHER									

COMMENTS: **FM RADIO CONTROL**

ANNUAL ENERGY SAVINGS SUMMARY
FOR GYMNASIUM's - BUILDINGS 826, 640, & 746

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Baseline Annual Electric (MBtu)	ECO 1 - Annual Electric (MBtu)	Annual Electric Energy Savings (MBtu)	Baseline Peak Electric Demand (kW)	ECO 1 - Peak Electric Demand (kW)	Peak Electric Demand Savings (kW)	Baseline Nat. Gas Energy Savings (MBtu)	ECO 1 - Annual Nat. Gas (MBtu)	Annual Nat. Gas Energy Savings (MBtu)
826	0.00	0.00	0.00	12.10	12.10	0.00	8464.22	8303.89	160.33

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 826 (SF)	Square Foot Adjust-ment Factor	Annual Electric Energy Savings (MBtu)	Adjusted Annual Electric Energy Savings* (MBtu)	Peak Electric Demand Savings (kW)	Adjusted Peak Electric Demand Savings* (kW)	Annual Nat. Gas Energy Savings (MBtu)	Adjusted Annual Nat. Gas Energy Savings* (MBtu)
640	20,425	20,425	1.000	0.00	0.00	0.00	0.00	160.33	160.33
746	20,425	20,425	1.000	0.00	0.00	0.00	0.00	160.33	160.33

*Energy savings prorated on a square foot basis

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Baseline Annual Electric (MBtu)	ECO 2 - Annual Electric (MBtu)	Annual Electric Energy Savings (MBtu)	Baseline Peak Electric Demand (kW)	ECO 2 - Peak Electric Demand (kW)	Peak Electric Demand Savings (kW)	Baseline Annual Nat. Gas (MBtu)	ECO 2 - Annual Nat. Gas (MBtu)	Annual Nat. Gas Energy Savings (MBtu)
826	0.00	0.00	0.00	12.10	12.10	0.00	8464.22	8297.25	166.97

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 826 (SF)	Square Foot Adjust-ment Factor	Annual Electric Energy Savings (MBtu)	Adjusted Annual Electric Energy Savings* (MBtu)	Peak Electric Demand Savings (kW)	Adjusted Peak Electric Demand Savings* (kW)	Annual Nat. Gas Energy Savings (MBtu)	Adjusted Annual Nat. Gas Energy Savings* (MBtu)
640	20,425	20,425	1.000	0.00	0.00	0.00	0.00	166.97	166.97
746	20,425	20,425	1.000	0.00	0.00	0.00	0.00	166.97	166.97

*Energy savings prorated on a square foot basis

INVESTMENT COST SUMMARY
FOR GYMNASIUM's - BUILDINGS 826, 640, & 746

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Investment Cost ($)
826	$129,351

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 825 (SF)	Square Foot Adjust-ment Factor	Investment Cost ($)	Adjusted Investment Cost ($)*
640	20,425	20,425	1.000	$129,351	$129,351
746	20,425	20,425	1.000	$129,351	$129,351

*Investment Cost prorated on a square foot basis

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Investment Cost ($)
826	$139,097

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 826 (SF)	Square Foot Adjust-ment Factor	Investment Cost ($)	Adjusted Investment Cost ($)*
640	20,425	20,425	1.000	$139,097	$139,097
746	20,425	20,425	1.000	$139,097	$139,097

*Investment Cost prorated on a square foot basis

LIFE CYCLE COST ANALYSIS SUMMARY

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Leonard Wood	REGION: 2 (Missouri)		PROJECT NO:	1406-011
PROJECT TITLE:	Limited Energy Study, Insulate Brick Buildings			FISCAL YEAR:	1996
ANALYSIS DATE:	02/18/96	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz

1. INVESTMENT: **BLDG 826 - INSTALL 3.5" BATT INSULATION ON WALLS**

A.	CONSTRUCTION COST	=	$114,470	
B.	SIOH COST	(7.0% of 1A) =	$8,013	
C.	DESIGN COST	(6.0% of 1A) =	$6,868	
D.	TOTAL COST	(1A +1B +1C) =	$129,351	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT	=	$0	
F.	PUBLIC UTILITY COMPANY REBATE	=	$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$129,351

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96

	ENERGY SOURCE	FUEL COS $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$7.33	0	$0	13.80	$0	
B.	DIST	$0.00	0	$0	0.00	$0	
C.	NAT GAS	$5.30	160.33	$850	17.76	$15,092	
D.	COAL	$0.00	0	$0	0.00	$0	
E.	ELEC. DEMAND			$0	13.47	$0	
F.	TOTAL		160.33	$850		-------->	$15,092

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1	ANNUAL MAINTENANCE	$0	$0
2		$0	$0
3		$0	$0
4	TOTAL ANNUAL DISC. SAVINGS (+) / COST	$0	$0

B. NON-RECURRING (+/-)

	ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)	
a.	BASELINE EQUIP. REPLCMNT.				$0	
b.					$0	
c.					$0	
d.					$0	
e.					$0	
f.	TOTAL	$0			$0	

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = $0

4.	FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-)	(2F3 + 3A4 + (3Bf1/Economic Life))	$850
5.	SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY)	(1G/4) =	152.22
6.	TOTAL NET DISCOUNTED SAVINGS	(2F5 + 3C) =	$15,092
7.	DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (MUST HAVE SIR > 1.25 TO QUALIFY)	(6/1G) =	0.12

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	SHEET 1 OF 1	
ENGINEER	E M C Engineers, Inc.	DATE PREPARED	18-Feb-96
	Denver, CO	ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST Quantity	Unit Cost	Total	LABOR COST Crew/ Worker	Hours/ Unit	Total	TOTAL
1		**BUILDING 826**								
2		**INSTALL 3.5" BATT INSULATION ON WALLS**								
3										
4	I3-1/2I	INSTALL 3-1/2" BATT INSULATION	S.F.	17785.0	$0.18	$3,224	1-CARP	0.007	$3,271	$6,495
5	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	17195.0	$0.20	$3,445	2-CARP	0.017	$15,360	$18,805
6	ISW	INSTALL 2"x4" STUDDED WALL 2' OC	L.F.	9341.0	$0.24	$2,201	F-2	0.009	$4,633	$6,834
7	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	17785.0	$0.07	$1,188	1-PORD	0.01	$4,293	$5,480
8	R15B	RELOCATE 15' HIGH 104' LONG BLEACHERS	EA.	1.0	$0.00	$0	F-5	56	$6,124	$6,124
9	R4WMH	RELOCATE 4'-0" BASEBOARD RADIATION	EA.	3.0	$18.39	$55	Q-6	4.48	$1,176	$1,231
10	RBBR	RELOCATE BASKETBALL BACKBOARD & RIM	EA.	2.0	$0.00	$0	L-2	24	$2,227	$2,227
11	RBM	RELOCATE BATHROOM MIRROR	EA.	1.0	$0.00	$0	1-CARP	0.356	$9	$9
12	REC	RELOCATE 3/4" ELECTRICAL CONDUIT	L.F.	3.0	$1.16	$3	1-ELEC	0.089	$8	$12
13	REDS	RELOCATE ELECTRIC DISCONNECT SWITCH	EA.	6.0	$0.00	$0	1-ELEC	5.2	$950	$950
14	REES	RELOCATE ELECTRICAL EXIT SIGN	EA.	1.0	$0.00	$0	1-ELEC	1.5	$46	$46
15	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	2.0	$8.82	$18	1-ELEC	0.844	$51	$69
16	REO	RELOCATE ELECTRICAL OUTLET	EA.	2.0	$7.97	$16	1-ELEC	0.896	$55	$70
17	RES	RELOCATE ELECTRIC SCOREBOARD	EA.	1.0	$0.00	$0	R-3	24	$2,487	$2,487
18	RFE	RELOCATE FIRE EXTINGUISHER	EA.	1.0	$0.00	$0	1-CARP	0.2	$5	$5
19	RGL	REMOVE GYM LOCKER	EA.	1.0	$0.00	$0	1-CARP	0.9	$24	$24
20	RMWRC	RELOCATE MAPLE WALL IN RACQUETBALL CRT.	EA.	1.0	$8,371.35	$8,371	3-CARP	88	$6,936	$15,307
21	RS	RELOCATE SPEAKER	EA.	2.0	$0.00	$0	1-ELEC	1.5	$91	$91
22	RT	RELOCATE THERMOSTAT	EA.	2.0	$0.00	$0	1-ELEC	1.7	$103	$103
23	RFCU	RELOCATE FAN COIL UNIT	EA.	1.0	$20.30	$20	Q-6	5.67	$496	$516
24	IWB-5/8	INSTALL 5/8" WATERPRF BRD - TAPED & SANDE	S.F.	590.0	$0.96	$563	2-CARP	0.02	$620	$1,183
25	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	590.0	$1.83	$1,081	2-TILE	0.084	$2,400	$3,481
26										
27		**SUBTOTAL**				$20,185			$51,366	$71,551
28	DIFF	DIFFICULTLY FACTOR			5%				$2,568	$2,568
29		**SUBTOTAL**				$20,185			$53,934	$74,120
30	OH	OVERHEAD			17%	$3,432			$9,169	$12,600
31		**SUBTOTAL**				$23,617			$63,103	$86,720
32	PRO	PROFIT			10%	$2,362			$6,310	$8,672
33		**SUBTOTAL**				$25,979			$69,413	$95,392
34	CONT	CONTINGENCY			20%	$5,196			$13,883	$19,078
35	**TOTAL COST**					$31,174			$83,296	$114,470

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Leonard Wood	REGION: 2 (Missouri)		PROJECT NO:	1406-011
PROJECT TITLE:	Limited Energy Study, Insulate Brick Buildings			FISCAL YEAR:	1996
ANALYSIS DATE:	02/18/96	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz

1. INVESTMENT: **BLDG 826 - INSTALL 1.5" RIGID INSULATION ON WALLS**

A.	CONSTRUCTION COST	=	$123,094	
B.	SIOH COST	(7.0% of 1A) =	$8,617	
C.	DESIGN COST	(6.0% of 1A) =	$7,386	
D.	TOTAL COST	(1A +1B +1C) =	$139,097	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT	=	$0	
F.	PUBLIC UTILITY COMPANY REBATE	=	$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$139,097

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96

	ENERGY SOURCE	FUEL COS $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$7.33	0	$0	13.80	$0	
B.	DIST	$0.00	0	$0	0.00	$0	
C.	NAT GAS	$5.30	166.97	$885	17.76	$15,717	
D.	COAL	$0.00	0	$0	0.00	$0	
E.	ELEC. DEMAND			$0	13.47	$0	
F.	TOTAL		166.97	$885		-------->	$15,717

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1	ANNUAL MAINTENANCE	$0	$0
2		$0	$0
3		$0	$0
4	TOTAL ANNUAL DISC. SAVINGS (+) / COST	$0	$0

B. NON-RECURRING (+/-)

	ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)
a.	BASELINE EQUIP. REPLCMNT.				$0
b.					$0
c.					$0
d.					$0
e.					$0
f.	TOTAL	$0			$0

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = $0

4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3 + 3A4 + (3Bf1/Economic Life)) $885

5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = 157.18

6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) = $15,717

7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.11
   (MUST HAVE SIR > 1.25 TO QUALIFY)

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	SHEET 1	OF 1
ENGINEER	E M C Engineers, Inc.	DATE PREPARED	18-Feb-96
	Denver, CO	ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST Quantity	Unit Cost	Total	LABOR COST Crew/ Worker	Hours/ Unit	Total	TOTAL
1		**BUILDING 826**								
2		**INSTALL 1.5" RIGID INSULATION ON WALLS**								
3										
4	I1-1/2RI	INSTALL 1-1/2" RIGID INSULATION	S.F.	17785.0	$0.59	$10,519	1-CARP	0.008	$3,738	$14,258
5	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	17195.0	$0.20	$3,445	2-CARP	0.017	$15,360	$18,805
6	IFS	INSTALL 3/4"x2" FURRING STRIPS	L.F.	7693.0	$0.19	$1,468	1-CARP	0.016	$3,234	$4,702
7	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	17785.0	$0.07	$1,188	1-PORD	0.01	$4,293	$5,480
8	R15B	RELOCATE 15' HIGH 104' LONG BLEACHERS	EA.	1.0	$0.00	$0	F-5	56	$6,124	$6,124
9	R4WMH	RELOCATE 4'-0" BASEBOARD RADIATION	EA.	3.0	$18.39	$55	Q-6	4.48	$1,176	$1,231
10	RBBR	RELOCATE BASKETBALL BACKBOARD & RIM	EA.	2.0	$0.00	$0	L-2	24	$2,227	$2,227
11	RBM	RELOCATE BATHROOM MIRROR	EA.	1.0	$0.00	$0	1-CARP	0.356	$9	$9
12	REC	RELOCATE 3/4" ELECTRICAL CONDUIT	L.F.	3.0	$1.16	$3	1-ELEC	0.089	$8	$12
13	REDS	RELOCATE ELECTRIC DISCONNECT SWITCH	EA.	6.0	$0.00	$0	1-ELEC	5.2	$950	$950
14	REES	RELOCATE ELECTRICAL EXIT SIGN	EA.	1.0	$0.00	$0	1-ELEC	1.5	$46	$46
15	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	2.0	$8.82	$18	1-ELEC	0.844	$51	$69
16	REO	RELOCATE ELECTRICAL OUTLET	EA.	2.0	$7.97	$16	1-ELEC	0.896	$55	$70
17	RES	RELOCATE ELECTRIC SCOREBOARD	EA.	1.0	$0.00	$0	R-3	24	$2,487	$2,487
18	RFE	RELOCATE FIRE EXTINGUISHER	EA.	1.0	$0.00	$0	1-CARP	0.2	$5	$5
19	RGL	REMOVE GYM LOCKER	EA.	1.0	$0.00	$0	1-CARP	0.9	$24	$24
20	RMWRC	RELOCATE MAPLE WALL IN RACQUETBALL CRT.	EA.	1.0	$8,371.35	$8,371	3-CARP	88	$6,936	$15,307
21	RS	RELOCATE SPEAKER	EA.	2.0	$0.00	$0	1-ELEC	1.5	$91	$91
22	RT	RELOCATE THERMOSTAT	EA.	2.0	$0.00	$0	1-ELEC	1.7	$103	$103
23	RFCU	RELOCATE FAN COIL UNIT	EA.	1.0	$20.30	$20	Q-6	5.67	$496	$516
24	IWB-5/8	INSTALL 5/8" WATERPRF BRD - TAPED & SANDE	S.F.	590.0	$0.96	$563	2-CARP	0.02	$620	$1,183
25	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	590.0	$1.83	$1,081	2-TILE	0.084	$2,400	$3,481
26										
27		**SUBTOTAL**				$26,748			$50,434	$77,182
28	DIFF	DIFFICULTLY FACTOR			5%				$2,522	$2,522
29		**SUBTOTAL**				$26,748			$52,956	$79,704
30	OH	OVERHEAD			17%	$4,547			$9,002	$13,550
31		**SUBTOTAL**				$31,295			$61,958	$93,253
32	PRO	PROFIT			10%	$3,130			$6,196	$9,325
33		**SUBTOTAL**				$34,425			$68,154	$102,579
34	CONT	CONTINGENCY			20%	$6,885			$13,631	$20,516
35	**TOTAL COST**					$41,309			$81,785	$123,094

E M C ENGINEERS, INC.

DATE: Feb-96

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS BY: DMS

CLIENT CONTRACT NO.: DACA 01-94D-0033 JOB: 1406.011

LOCATION: FT LEONARD WOOD, MO. CHK: AJN

FILE: 826BHL

BUILDING HEATING LOAD CALCULATION SHEET

BLDG NO: 826 BLDG NAME: GYMNASIUM

BLDG FUNCTION: BASKETBALL, RACQUET BALL, WEIGHT LIFTING

FLOOR AREA: (SQ. FT) 19,827 # FLOORS 1

SLAB PERIMETER: (FT) 588

I. AREAS: ([ ] FIELD VERIFIED ELEVATION PLANS)

		NORTH	SOUTH	EAST	WEST	TOTAL
WALLS, GROSS	(SQ. FT)	5,844	6,252	3,420	2,660	18,176
GLASS	(SQ. FT)	42	55	0	0	97
PERSONNEL DOOR	(SQ. FT)	84	168	42	0	294
INSULATED PANEL	(SQ. FT)	345	324	0	120	789
WALLS, NET	(SQ. FT)	5,373	5,705	3,378	2,540	16,996
ROOF AREA (OR CEILING AREA IF ATTIC IS UNCONDITIONED)					(SQ. FT)	19,827
INSULATED PANEL	(SQ. FT)	789	PERSONNEL DOOR		(SQ. FT)	294
BASEMENT WALLS	(SQ. FT)	0	0	0	0	0

II. CONSTRUCTION: ([ ] FIELD VERIFIED WALL, ROOF, WINDOW, DOOR TYPES)

WALLS: (SKETCH CROSS SECTION OF WALL)	COMPONENTS	R-VALUE
	1. OUTSIDE AIR FILM	0.17
	2. 4" FACE BRICK	0.43
	3. AIR SPACE	0.91
	4. 6" CONCRETE BLK	1.89
	5.	
	6.	
	7. INSIDE AIR FILM	0.68
	TOTAL R-WALL =	4.08
	U=1/R	0.245

ROOF: (SKETCH CROSS SECTION OF ROOF)	COMPONENTS	R-VALUE
	1. OUTSIDE AIR FILM	0.17
	2. BUILT UP ROOF	0.34
	3. 2" RIGID INSULATION	8.00
	4. 2" POURED GYPSUM	1.80
	5. 1" FORM BOARD	1.20
	6.	
	7. INSIDE AIR FILM	0.68
	TOTAL R-ROOF =	12.19
	U=1/R	0.082

GLASS TYPE:	PPG 'PENNVERNON' C.L. TWNDV, SSA, .88 S.C.	R-GLASS	1.61
SLAB TYPE FLOOR:	CEMENT	SLF	0.83
BASEMENT TYPE:	NONE	R-BASEM.	0.00
INSULATED PANEL:		R-PANEL	4.20
PERSONNEL DOOR TYPE:	METAL	R-PDOOR	2.56

III. INFILTRATION:

TIGHT WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
AVG. WALL H/M/L (SQ.FT.)	M	18176	X CFM / SQ.FT.	0.115	=	2,090
LEAKY WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
DOOR OPENINGS / HR - SINGLE DOOR			X CFM /OPENING /HR	1.600	=	0
DOOR OPENINGS / HR - DOUBLE DOORS		40	X CFM /OPENING /HR	1.385	=	55
			TOTAL INFILTRATION (CFM)		=	2146

UA PANEL	PANEL AREA	789	X PANEL "U"	0.238	=	188
UA PDOOR	PDOOR AREA	294	X DOOR "U"	0.391	=	115
UA WALL	WALL AREA	16,207	X WALL "U"	0.245	=	4,166
UA ROOF	ROOF AREA	19,827	X ROOF "U"	0.082	=	1,627
UA GLASS	GLASS AREA	97	X GLASS "U"	0.621	=	60
UA SLAB	SLAB PERIM.	588	X SLF	0.830	=	488
UA BASEM.	B-WALL AREA	0	X BASE. "U"	0.000	=	0
INFILTRATION	CFM	2146	X A. T. F.	1.035	=	2,221
			TOTAL UA (BTU/HR°F)			8,865

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 826Z1
BLDG: 826 ZONE: 1

Rates of Heat Gain from Occupants of Conditioned Spaces

Zone No.	No. of People	Activity Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)
1	5	4	Seated, light work, typing	Offices, hotels, apts	250	200	1,250	1,000
	80	11	Heavy work, athletics	Gymnasium	710	1,090	56,800	87,200
TOTA	85					TOTAL	58,050	88,200

Peak Wattage Value for Lights

Zone No.	No. of Fixtures	Fixture Type	Description	Watts/Fixture	Total Wattage
1	40	35	Merc. Vap. - Medium Base, 75w with 18w ballast	93	3,720
	10	18	Incandescent - 60w	60	600
	34	16	Fluorescent, 2 - 15w lamps, 5w ballast	35	1,190
	10	10	Fluorescent, 2 - 34w lamps, 4w ballast (2x4 ft. fixture)	72	720
	35	47	HPS - Medium Base, 35w with 11w ballast	46	1,610
	3	38	Merc. Vap. - Mogul Base, 175w with 25w ballast	200	600
TOTA	132			TOTAL	8,440

Peak Value for Internal Gains

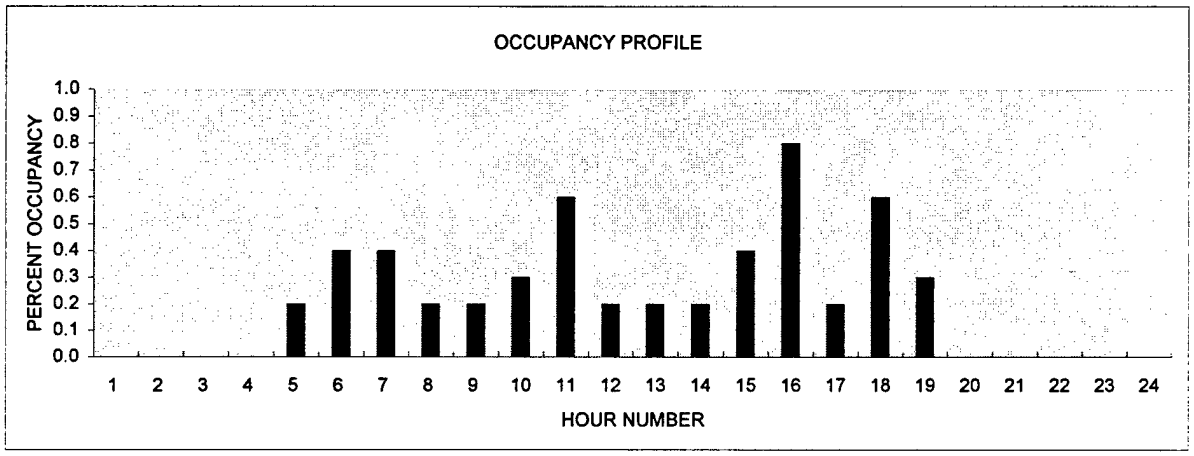
Zone No.	No. of Equipment	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattag	Total (BTU)
1	1	3	Microcomputer	350	91%	350	1,195
	1	24	Coffee Maker	1,500	30%	1,500	5,120
	1	49	Radio	71	10%	71	242
	2	70	Water Cooler	700	50%	1,400	4,778
	1	62	Television (Color, tube)	300	15%	300	1,024
	2	25	Cold Food/Beverage	1,535	50%	3,070	10,478
				TOTAL	46%	6,691	22,836

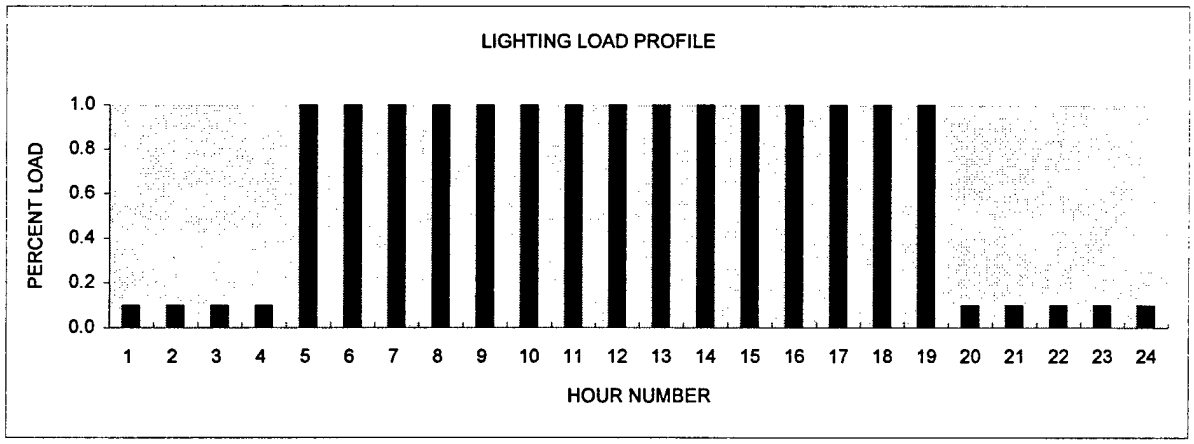
E M C Engineers, Inc.

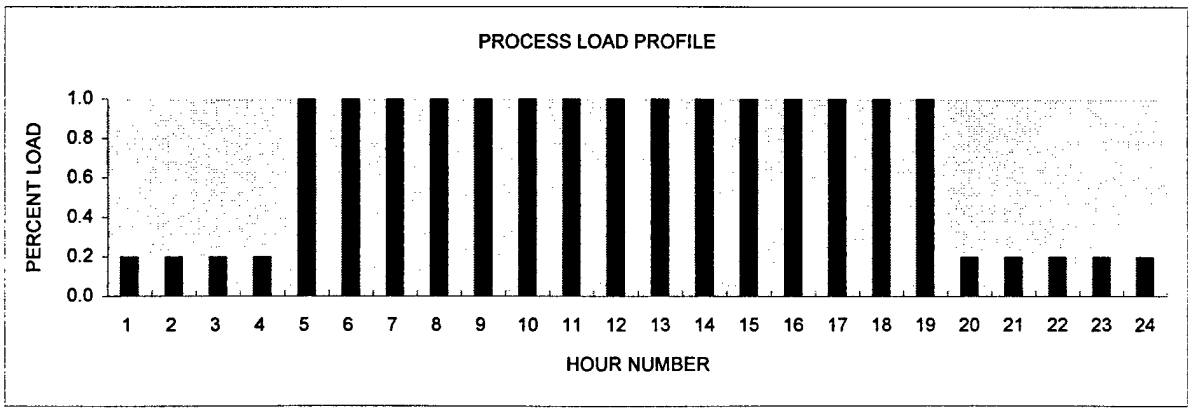
PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 826Z1
BLDG: 826
ZONE: 1

BLDG TYPE	BLDG FUNCTION	TYPE OF PROFILE	HOUR NUMBER																							
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
6	Gym	OCCUPANC	0.0	0.0	0.0	0.0	0.2	0.4	0.4	0.2	0.2	0.3	0.6	0.2	0.2	0.2	0.4	0.8	0.2	0.6	0.3	0.0	0.0	0.0	0.0	0.0
		LIGHTING	0.1	0.1	0.1	0.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.1	0.1	0.1	0.1	0.1
		PROCESS	0.2	0.2	0.2	0.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.2	0.2	0.2	0.2	0.2







V:\1406.011\COLECTD\FIELD\PLE\826Z1.XLS

BLDG 826 - GYMNASIUM BASELINE

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 0

ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0

WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000

LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1

SKY CLEARNESS FACTOR (CLN) 1.000000

NUMBER OF ZONES (NZ) 1

WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1

WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA --------------

******REAL WEATHER FROM DISK*******

FILE NAME MO

STATION 13995 YEAR 1955

SITE LATITUDE DEG (AL1) 37.750000

ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000

MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000

AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000

SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01

SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01

SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01

INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000

INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000

INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03

INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00

VOLUME OF ZONE IN CUBIC FEET (VOLHS) 553768.100000

FLOOR AREA (SQFT) 19827.000000

HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 2376820.000000

COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00

COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 198270.000000

CONSTANT INFILTRATION RATE CFM (CFMI) 2146.000000

INFILTRATION PROFILE

1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

A FACTOR IN INFILTRATION EQUATION (CINA) 2.330000E-01

B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02

C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03

BUILDING THERMAL MASS MCP BTU/F (CMCP) 48600.000000

BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00

SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 488.000000

PARTITION UA BTU/HR-F (GUA) 0.000000E+00

DOOR UA BTU/HR-F (DUA) 115.000000

WINDOW GLASS NUMBER (NG) 30

DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01

NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01

WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	6029.0	2660.0	5718.0	3378.0
WINDOW AREA SQFT (AWND)	55.0	.0	42.0	.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	5.5	.0	4.2	.0
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.245	.245	.245
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01837	.01837	.01837	.01837
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00003	.00003	.00003	.00003
N=2	.00283	.00283	.00283	.00283
N=3	.01017	.01017	.01017	.01017
N=4	.00498	.00498	.00498	.00498
N=5	.00037	.00037	.00037	.00037
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	-.07415	-.07415	-.07415	-.07415
N=5	.00212	.00212	.00212	.00212
N=6	********	********	********	********

ROOF AREA SQFT (AROF) 19827.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 8.200000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 5.226374E-03
ROOF B TRANSFER FUNCTIONS (BNR)
.901E-04 .225E-02 .261E-02 .270E-03 900. 900.
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.16 .223 -.220E-02 999. 999.
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.600000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	BTU/HR			THERMOSTAT SET POINT DEG F	
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	8.	10505.	58050.	88200.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.200	.000	.000	68.0	.0
2	.100	.200	.000	.000	68.0	.0
3	.100	.200	.000	.000	68.0	.0
4	.100	.200	.000	.000	68.0	.0
5	1.000	1.000	.200	.200	68.0	.0
6	1.000	1.000	.400	.400	68.0	.0
7	1.000	1.000	.400	.400	68.0	.0
8	1.000	1.000	.200	.200	68.0	.0

```
  9        1.000     1.000      .200      .200        68.0         .0
 10        1.000     1.000      .300      .300        68.0         .0
 11        1.000     1.000      .600      .600        68.0         .0
 12        1.000     1.000      .200      .200        68.0         .0
 13        1.000     1.000      .200      .200        68.0         .0
 14        1.000     1.000      .200      .200        68.0         .0
 15        1.000     1.000      .400      .400        68.0         .0
 16        1.000     1.000      .800      .800        68.0         .0
 17        1.000     1.000      .200      .200        68.0         .0
 18        1.000     1.000      .600      .600        68.0         .0
 19        1.000     1.000      .300      .300        68.0         .0
 20         .100      .200      .000      .000        68.0         .0
 21         .100      .200      .000      .000        68.0         .0
 22         .100      .200      .000      .000        68.0         .0
 23         .100      .200      .000      .000        68.0         .0
 24         .100      .200      .000      .000        68.0         .0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)      68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)     100.000000
SYSTEM TYPE, (IECN)          2
SUPPLY AIR CFM (SACFM)   45480.000000
ECONOMIZER HIGH TEMP LIMIT F      100.000000
SYSTEM SUPPLY AIR START TIME HR    0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR       24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)      70.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)        1.000000
FAN EFFICIENCY (EFAN)    5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)    3.750000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 2376820.000000
HEATING PLANT RATED INPUT BTU (HFLIN)  2971025.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)          4
COOLING PLANT RATED OUTPUT BTU (CFLOT)    1.000000E-10
COOLING PLANT RATED INPUT BTU (CFLIN)    0.000000E+00
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 826 - GYMNASIUM BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	2.	0.	0.	0.	0.	0.	0.	0.
	-1152.	LOSS		-42.	-14.	0.	-78.	-1.	-1057.	0.
FEB	0.	GAIN	2.	0.	0.	0.	1.	0.	0.	0.
	-929.	LOSS		-34.	-12.	0.	-55.	-1.	-865.	0.
MAR	0.	GAIN	2.	0.	0.	0.	6.	0.	1.	0.
	-898.	LOSS		-31.	-11.	0.	-46.	-1.	-857.	0.
APR	0.	GAIN	2.	0.	0.	0.	15.	0.	4.	0.
	-415.	LOSS		-17.	-6.	0.	-22.	-1.	-427.	0.
MAY	0.	GAIN	2.	1.	0.	0.	25.	0.	6.	0.
	-180.	LOSS		-7.	-3.	0.	-7.	0.	-233.	0.
JUN	.00	GAIN	2.41	1.45	.16	.00	31.80	.01	7.28	.00
	-21.67	LOSS		-3.03	-1.95	.00	-1.74	-.16	-91.64	.00
JUL	.00	GAIN	2.43	1.76	.23	.00	32.14	.02	12.69	.00
	-11.56	LOSS		-2.95	-1.87	.00	-1.39	-.16	-90.60	.00
AUG	.00	GAIN	2.11	1.25	.24	.00	29.16	.02	11.47	.00
	-10.07	LOSS		-2.98	-1.77	.00	-1.63	-.14	-84.30	.00
SEP	0.	GAIN	2.	0.	0.	0.	20.	0.	10.	0.
	-132.	LOSS		-8.	-3.	0.	-7.	0.	-182.	0.
OCT	0.	GAIN	2.	0.	0.	0.	10.	0.	4.	0.
	-415.	LOSS		-18.	-6.	0.	-23.	0.	-421.	0.
NOV	0.	GAIN	1.	0.	0.	0.	3.	0.	1.	0.
	-704.	LOSS		-28.	-9.	0.	-44.	-1.	-666.	0.
DEC	0.	GAIN	1.	0.	0.	0.	0.	0.	1.	0.
	-1120.	LOSS		-40.	-13.	0.	-74.	-1.	-1033.	0.
TOT	0.	GAIN	23.	5.	1.	0.	174.	0.	57.	0.
	-5990.	LOSS		-233.	-83.	0.	-360.	-7.	-6006.	0.

MAX HEATING LOAD= -2376820. BTUH ON DEC 28 HOUR 9 AMBIENT TEMP 31.
MAX COOLING LOAD= 0. BTUH ON DEC 31 HOUR 24 AMBIENT TEMP 42.

ZONE UA BTU/HR-F 6158.3

BLDG 826 - GYMNASIUM BASELINE

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	65.	68.		4	16	63.	4.16	11.89	9.24	38.27
			25.	29	3	10.				
FEB	65.	69.		13	16	68.	3.76	10.74	8.35	34.57
			36.	19	7	13.				
MAR	67.	79.		28	16	76.	4.16	11.89	8.83	37.86
			49.	14	7	18.				
APR	70.	88.		30	15	84.	4.03	11.51	8.22	36.31
			65.	9	4	31.				
MAY	73.	94.		26	19	75.	4.16	11.89	7.49	36.52
			67.	11	4	38.				
JUN	77.	97.		30	19	82.	4.03	11.51	6.47	34.56
			68.	18	4	57.				
JUL	81.	106.		28	18	90.	4.16	11.89	6.63	35.66
			67.	2	3	70.				
AUG	79.	100.		11	19	84.	4.16	11.89	7.06	36.08
			67.	6	3	69.				
SEP	75.	99.		2	18	86.	4.03	11.51	6.61	34.70
			67.	10	3	69.				
OCT	69.	87.		1	15	85.	4.16	11.89	8.24	37.26
			67.	11	4	39.				
NOV	68.	79.		8	15	76.	4.03	11.51	8.76	36.85
			55.	2	23	20.				
DEC	64.	69.		23	16	67.	4.16	11.89	9.17	38.20
			6.	18	7	-1.				
YEAR							48.98	140.03	95.08	436.84

BLDG 826 - GYMNASIUM BASELINE

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	744	0	180	0	-.2377E+07	.0000
FEB	671	0	138	0	-.2377E+07	.0000
MAR	692	0	91	0	-.2377E+07	.0000
APR	522	0	4	0	-.2377E+07	.0000
MAY	398	0	0	0	-.1836E+07	.0000
JUN	135	0	0	0	-.6624E+06	.0000
JUL	76	0	0	0	-.5802E+06	.0000
AUG	68	0	0	0	-.4572E+06	.0000
SEP	266	0	0	0	-.1431E+07	.0000
OCT	543	0	0	0	-.2154E+07	.0000
NOV	664	0	43	0	-.2377E+07	.0000
DEC	738	0	236	0	-.2377E+07	.0000
YEAR	5517	0	692	0	-.2377E+07	.0000

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
MONTH	HEATING MILLION BTU	COOLING THOUSAND KWH	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FANS THOUSAND KWH	HEAT GAIN MILLION BTU	ELECTRIC DEMAND KW
JAN	1510.68	.00	4.16	11.89	2.71	38.27	12.1
FEB	1241.73	.00	3.76	10.74	2.45	34.57	12.1
MAR	1216.91	.00	4.16	11.89	2.59	37.86	12.1
APR	630.39	.00	4.03	11.51	2.41	36.31	12.1
MAY	339.56	.00	4.16	11.89	2.19	36.52	12.1
JUN	81.51	.00	4.03	11.51	1.90	34.56	12.1
JUL	45.32	.00	4.16	11.89	1.94	35.66	12.1
AUG	39.82	.00	4.16	11.89	2.07	36.08	12.1
SEP	240.58	.00	4.03	11.51	1.94	34.70	12.1
OCT	637.57	.00	4.16	11.89	2.41	37.26	12.1
NOV	999.62	.00	4.03	11.51	2.57	36.85	12.1
DEC	1480.53	.00	4.16	11.89	2.69	38.20	12.1
YEAR	8464.22	.00	48.98	140.03	27.86	436.84	12.1

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 447193. BTU/(SQFT-YEAR)

BLDG 826 - GYMNASIUM BASELINE

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	180	.0000	-.2377E+07
FEB	1464.	929.	1.000	37.	0.	0.	0	138	.0000	-.2377E+07
MAR	1922.	1254.	1.000	43.	0.	0.	0	91	.0000	-.2377E+07
APR	2312.	1600.	1.000	55.	0.	0.	0	4	.0000	-.2377E+07
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.0000	-.1836E+07
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	-.6624E+06
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	-.5802E+06
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	-.4572E+06
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	-.1431E+07
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.0000	-.2154E+07
NOV	1039.	732.	1.000	47.	0.	0.	0	43	.0000	-.2377E+07
DEC	883.	604.	1.000	35.	0.	0.	0	236	.0000	-.2377E+07

BLDG 826 - GYMNASIUM ECO-1 INSTALL 3.5" FIBERGLASS BATT INSUL. ON WALLS

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 0
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA --------------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 553768.100000
FLOOR AREA (SQFT) 19827.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 2376820.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 198270.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 2146.000000
INFILTRATION PROFILE

1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

A FACTOR IN INFILTRATION EQUATION (CINA) 2.330000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 48600.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 488.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 115.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	6029.0	2660.0	5718.0	3378.0
WINDOW AREA SQFT (AWND)	55.0	.0	42.0	.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	5.5	.0	4.2	.0
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.064	.064	.064	.064
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00176	.00176	.00176	.00176
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00016	.00016	.00016	.00016
N=3	.00086	.00086	.00086	.00086
N=4	.00066	.00066	.00066	.00066
N=5	.00008	.00008	.00008	.00008
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	-.16643	-.16643	-.16643	-.16643
N=5	.00728	.00728	.00728	.00728
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 19827.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 8.200000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 5.226374E-03
ROOF B TRANSFER FUNCTIONS (BNR)
.901E-04 .225E-02 .261E-02 .270E-03 900. 900.
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.16 .223 -.220E-02 999. 999.
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.600000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	8.	10505.	58050.	88200.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.200	.000	.000	68.0	.0
2	.100	.200	.000	.000	68.0	.0
3	.100	.200	.000	.000	68.0	.0
4	.100	.200	.000	.000	68.0	.0
5	1.000	1.000	.200	.200	68.0	.0
6	1.000	1.000	.400	.400	68.0	.0
7	1.000	1.000	.400	.400	68.0	.0
8	1.000	1.000	.200	.200	68.0	.0

```
  9        1.000     1.000      .200      .200        68.0         .0
 10        1.000     1.000      .300      .300        68.0         .0
 11        1.000     1.000      .600      .600        68.0         .0
 12        1.000     1.000      .200      .200        68.0         .0
 13        1.000     1.000      .200      .200        68.0         .0
 14        1.000     1.000      .200      .200        68.0         .0
 15        1.000     1.000      .400      .400        68.0         .0
 16        1.000     1.000      .800      .800        68.0         .0
 17        1.000     1.000      .200      .200        68.0         .0
 18        1.000     1.000      .600      .600        68.0         .0
 19        1.000     1.000      .300      .300        68.0         .0
 20         .100      .200      .000      .000        68.0         .0
 21         .100      .200      .000      .000        68.0         .0
 22         .100      .200      .000      .000        68.0         .0
 23         .100      .200      .000      .000        68.0         .0
 24         .100      .200      .000      .000        68.0         .0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)      68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)     100.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)   45480.000000
ECONOMIZER HIGH TEMP LIMIT F      100.000000
SYSTEM SUPPLY AIR START TIME HR    0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR       24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)      70.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)        1.000000
FAN EFFICIENCY (EFAN)    5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)    3.750000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 2376820.000000
HEATING PLANT RATED INPUT BTU (HFLIN)  2971025.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906      1.00      1.00
CHILLER TYPE (ITYPCH)           4
COOLING PLANT RATED OUTPUT BTU (CFLOT)    1.000000E-10
COOLING PLANT RATED INPUT BTU (CFLIN)    0.000000E+00
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 826 - GYMNASIUM ECO-1 INSTALL 3.5" FIBERGLASS BATT INSUL. ON WALLS

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	2.	0.	0.	0.	0.	0.	0.	0.
	-1113.	LOSS		-42.	-14.	0.	-20.	-1.	-1074.	0.
FEB	0.	GAIN	2.	0.	0.	0.	0.	0.	0.	0.
	-903.	LOSS		-34.	-12.	0.	-14.	-1.	-878.	0.
MAR	0.	GAIN	2.	0.	0.	0.	1.	0.	1.	0.
	-875.	LOSS		-31.	-11.	0.	-11.	-1.	-863.	0.
APR	0.	GAIN	2.	0.	0.	0.	3.	0.	4.	0.
	-403.	LOSS		-16.	-6.	0.	-4.	-1.	-421.	0.
MAY	0.	GAIN	2.	1.	0.	0.	6.	0.	5.	0.
	-181.	LOSS		-7.	-3.	0.	0.	0.	-222.	0.
JUN	.00	GAIN	2.41	1.84	.14	.00	8.60	.01	6.96	.00
	-23.03	LOSS		-2.37	-1.52	.00	.00	-.12	-72.83	.00
JUL	.00	GAIN	2.43	2.21	.21	.00	8.79	.02	12.61	.00
	-12.42	LOSS		-2.27	-1.45	.00	.00	-.12	-70.83	.00
AUG	.00	GAIN	2.11	1.60	.23	.00	7.89	.02	11.52	.00
	-10.22	LOSS		-2.33	-1.38	.00	.00	-.11	-66.22	.00
SEP	0.	GAIN	2.	0.	0.	0.	5.	0.	10.	0.
	-131.	LOSS		-7.	-3.	0.	-1.	0.	-172.	0.
OCT	0.	GAIN	2.	0.	0.	0.	1.	0.	3.	0.
	-402.	LOSS		-18.	-6.	0.	-5.	0.	-417.	0.
NOV	0.	GAIN	1.	0.	0.	0.	0.	0.	1.	0.
	-677.	LOSS		-28.	-9.	0.	-11.	-1.	-668.	0.
DEC	0.	GAIN	1.	0.	0.	0.	0.	0.	0.	0.
	-1090.	LOSS		-41.	-13.	0.	-20.	-1.	-1054.	0.
TOT	0.	GAIN	23.	7.	1.	0.	41.	0.	55.	0.
	-5821.	LOSS		-231.	-81.	0.	-87.	-7.	-5979.	0.

MAX HEATING LOAD= -2376820. BTUH ON DEC 28 HOUR 9 AMBIENT TEMP 31.
MAX COOLING LOAD= 0. BTUH ON DEC 31 HOUR 24 AMBIENT TEMP 42.

ZONE UA BTU/HR-F 2939.2

BLDG 826 - GYMNASIUM ECO-1 INSTALL 3.5" FIBERGLASS BATT INSUL. ON WALLS

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL INTERNAL HEAT GAIN MILLION BTU
JAN	66.	68.		4	16	63.	4.16	11.89	9.24	38.27
			28.	29	3	10.				
FEB	66.	69.		13	16	68.	3.76	10.74	8.35	34.57
			39.	19	7	13.				
MAR	67.	78.		28	16	76.	4.16	11.89	8.92	37.95
			52.	14	7	18.				
APR	69.	87.		30	15	84.	4.03	11.51	8.32	36.41
			67.	9	4	31.				
MAY	72.	88.		29	15	86.	4.16	11.89	7.38	36.41
			67.	11	4	38.				
JUN	76.	92.		30	19	82.	4.03	11.51	6.46	34.55
			68.	18	4	57.				
JUL	80.	100.		15	18	92.	4.16	11.89	6.61	35.64
			68.	2	3	70.				
AUG	78.	98.		29	15	96.	4.16	11.89	7.03	36.06
			68.	6	3	69.				
SEP	74.	96.		2	16	91.	4.03	11.51	6.61	34.70
			68.	10	3	69.				
OCT	69.	86.		1	15	85.	4.16	11.89	8.26	37.29
			67.	10	24	34.				
NOV	68.	79.		8	13	77.	4.03	11.51	8.73	36.82
			56.	2	23	20.				
DEC	65.	70.		23	16	67.	4.16	11.89	9.17	38.20
			9.	18	7	-1.				
YEAR							48.98	140.03	95.09	436.86

BLDG 826 - GYMNASIUM ECO-1 INSTALL 3.5" FIBERGLASS BATT INSUL. ON WALLS

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	744	0	158	0	-.2377E+07	.0000
FEB	671	0	131	0	-.2377E+07	.0000
MAR	699	0	81	0	-.2377E+07	.0000
APR	533	0	0	0	-.2368E+07	.0000
MAY	396	0	0	0	-.1775E+07	.0000
JUN	145	0	0	0	-.6381E+06	.0000
JUL	76	0	0	0	-.5772E+06	.0000
AUG	71	0	0	0	-.4663E+06	.0000
SEP	272	0	0	0	-.1379E+07	.0000
OCT	552	0	0	0	-.2067E+07	.0000
NOV	666	0	39	0	-.2377E+07	.0000
DEC	738	0	207	0	-.2377E+07	.0000
YEAR	5563	0	616	0	-.2377E+07	.0000

BEACON Energy Analysis By EMC Engineers, Inc. 826FG.I

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	1466.78	.00	4.16	11.89	2.71	38.27	12.1
FEB	1212.83	.00	3.76	10.74	2.45	34.57	12.1
MAR	1195.59	.00	4.16	11.89	2.61	37.95	12.1
APR	625.08	.00	4.03	11.51	2.44	36.41	12.1
MAY	337.79	.00	4.16	11.89	2.16	36.41	12.1
JUN	87.11	.00	4.03	11.51	1.89	34.55	12.1
JUL	46.06	.00	4.16	11.89	1.94	35.64	12.1
AUG	42.01	.00	4.16	11.89	2.06	36.06	12.1
SEP	241.80	.00	4.03	11.51	1.94	34.70	12.1
OCT	629.02	.00	4.16	11.89	2.42	37.29	12.1
NOV	972.05	.00	4.03	11.51	2.56	36.82	12.1
DEC	1447.76	.00	4.16	11.89	2.69	38.20	12.1
YEAR	8303.89	.00	48.98	140.03	27.86	436.86	12.1

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 439107. BTU/(SQFT-YEAR)

BLDG 826 - GYMNASIUM ECO-1 INSTALL 3.5" FIBERGLASS BATT INSUL. ON WALLS

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	158	.0000	-.2377E+07
FEB	1464.	929.	1.000	37.	0.	0.	0	131	.0000	-.2377E+07
MAR	1922.	1254.	1.000	43.	0.	0.	0	81	.0000	-.2377E+07
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.0000	-.2368E+07
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.0000	-.1775E+07
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	-.6381E+06
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	-.5772E+06
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	-.4663E+06
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	-.1379E+07
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.0000	-.2067E+07
NOV	1039.	732.	1.000	47.	0.	0.	0	39	.0000	-.2377E+07
DEC	883.	604.	1.000	35.	0.	0.	0	207	.0000	-.2377E+07

BLDG 826 - GYMNASIUM - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 0
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 553768.100000
FLOOR AREA (SQFT) 19827.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 2376820.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 198270.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 2146.000000
INFILTRATION PROFILE

1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

A FACTOR IN INFILTRATION EQUATION (CINA) 2.330000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 48600.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 488.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 115.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	6029.0	2660.0	5718.0	3378.0
WINDOW AREA SQFT (AWND)	55.0	.0	42.0	.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	5.5	.0	4.2	.0
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.055	.055	.055	.055
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00174	.00174	.00174	.00174
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00019	.00019	.00019	.00019
N=3	.00089	.00089	.00089	.00089
N=4	.00059	.00059	.00059	.00059
N=5	.00007	.00007	.00007	.00007
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	-.14508	-.14508	-.14508	-.14508
N=5	.00613	.00613	.00613	.00613
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 19827.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 8.200000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 5.226374E-03
ROOF B TRANSFER FUNCTIONS (BNR)
.901E-04 .225E-02 .261E-02 .270E-03 900. 900.
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.16 .223 -.220E-02 999. 999.
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.600000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	8.	10505.	58050.	88200.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.200	.000	.000	68.0	.0
2	.100	.200	.000	.000	68.0	.0
3	.100	.200	.000	.000	68.0	.0
4	.100	.200	.000	.000	68.0	.0
5	1.000	1.000	.200	.200	68.0	.0
6	1.000	1.000	.400	.400	68.0	.0
7	1.000	1.000	.400	.400	68.0	.0
8	1.000	1.000	.200	.200	68.0	.0

```
  9        1.000     1.000      .200      .200        68.0         .0
 10        1.000     1.000      .300      .300        68.0         .0
 11        1.000     1.000      .600      .600        68.0         .0
 12        1.000     1.000      .200      .200        68.0         .0
 13        1.000     1.000      .200      .200        68.0         .0
 14        1.000     1.000      .200      .200        68.0         .0
 15        1.000     1.000      .400      .400        68.0         .0
 16        1.000     1.000      .800      .800        68.0         .0
 17        1.000     1.000      .200      .200        68.0         .0
 18        1.000     1.000      .600      .600        68.0         .0
 19        1.000     1.000      .300      .300        68.0         .0
 20         .100      .200      .000      .000        68.0         .0
 21         .100      .200      .000      .000        68.0         .0
 22         .100      .200      .000      .000        68.0         .0
 23         .100      .200      .000      .000        68.0         .0
 24         .100      .200      .000      .000        68.0         .0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)      68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)     100.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)   45480.000000
ECONOMIZER HIGH TEMP LIMIT F      100.000000
SYSTEM SUPPLY AIR START TIME HR    0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR       24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)      70.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)        1.000000
FAN EFFICIENCY (EFAN)    5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)    3.750000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 2376820.000000
HEATING PLANT RATED INPUT BTU (HFLIN)  2971025.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)           4
COOLING PLANT RATED OUTPUT BTU (CFLOT)    1.000000E-10
COOLING PLANT RATED INPUT BTU (CFLIN)    0.000000E+00
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 826 - GYMNASIUM - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	2.	0.	0.	0.	0.	0.	0.	0.
	-1111.	LOSS		-42.	-14.	0.	-18.	-1.	-1075.	0.
FEB	0.	GAIN	2.	0.	0.	0.	0.	0.	0.	0.
	-901.	LOSS		-34.	-12.	0.	-12.	-1.	-878.	0.
MAR	0.	GAIN	2.	0.	0.	0.	1.	0.	1.	0.
	-874.	LOSS		-31.	-11.	0.	-9.	-1.	-864.	0.
APR	0.	GAIN	2.	0.	0.	0.	2.	0.	4.	0.
	-403.	LOSS		-16.	-6.	0.	-4.	-1.	-421.	0.
MAY	0.	GAIN	2.	1.	0.	0.	5.	0.	5.	0.
	-182.	LOSS		-7.	-3.	0.	0.	0.	-221.	0.
JUN	.00	GAIN	2.41	1.86	.14	.00	7.42	.01	7.11	.00
	-23.28	LOSS		-2.33	-1.50	.00	.00	-.12	-72.15	.00
JUL	.00	GAIN	2.43	2.24	.22	.00	7.59	.02	12.83	.00
	-12.53	LOSS		-2.23	-1.43	.00	.00	-.12	-70.06	.00
AUG	.00	GAIN	2.11	1.62	.23	.00	6.82	.02	11.72	.00
	-10.33	LOSS		-2.30	-1.37	.00	.00	-.11	-65.53	.00
SEP	0.	GAIN	2.	0.	0.	0.	4.	0.	10.	0.
	-131.	LOSS		-7.	-3.	0.	-1.	0.	-171.	0.
OCT	0.	GAIN	2.	0.	0.	0.	1.	0.	3.	0.
	-401.	LOSS		-18.	-6.	0.	-4.	0.	-417.	0.
NOV	0.	GAIN	1.	0.	0.	0.	0.	0.	1.	0.
	-676.	LOSS		-28.	-9.	0.	-9.	-1.	-669.	0.
DEC	0.	GAIN	1.	0.	0.	0.	0.	0.	0.	0.
	-1088.	LOSS		-41.	-13.	0.	-17.	-1.	-1055.	0.
TOT	0.	GAIN	23.	7.	1.	0.	36.	0.	55.	0.
	-5813.	LOSS		-231.	-81.	0.	-75.	-7.	-5979.	0.

MAX HEATING LOAD= -2376820. BTUH ON DEC 28 HOUR 9 AMBIENT TEMP 31.
MAX COOLING LOAD= 0. BTUH ON DEC 31 HOUR 24 AMBIENT TEMP 42.

ZONE UA BTU/HR-F 2779.1

BLDG 826 - GYMNASIUM - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	66.	68.		4	16	63.	4.16	11.89	9.24	38.27
			28.	29	3	10.				
FEB	66.	69.		13	16	68.	3.76	10.74	8.35	34.57
			39.	19	7	13.				
MAR	67.	78.		28	16	76.	4.16	11.89	8.92	37.95
			52.	14	7	18.				
APR	69.	86.		30	15	84.	4.03	11.51	8.32	36.41
			67.	9	4	31.				
MAY	72.	88.		29	15	86.	4.16	11.89	7.40	36.43
			67.	11	4	38.				
JUN	76.	92.		30	19	82.	4.03	11.51	6.46	34.55
			68.	18	4	57.				
JUL	80.	100.		15	18	92.	4.16	11.89	6.61	35.64
			68.	2	3	70.				
AUG	78.	98.		29	15	96.	4.16	11.89	7.03	36.06
			68.	6	3	69.				
SEP	74.	96.		2	16	91.	4.03	11.51	6.61	34.70
			68.	10	3	69.				
OCT	69.	86.		1	15	85.	4.16	11.89	8.26	37.29
			67.	10	24	34.				
NOV	68.	79.		8	13	77.	4.03	11.51	8.73	36.82
			56.	2	23	20.				
DEC	65.	70.		23	16	67.	4.16	11.89	9.17	38.20
			9.	18	7	-1.				
YEAR							48.98	140.03	95.11	436.88

BLDG 826 - GYMNASIUM - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	744	0	158	0	-.2377E+07	.0000
FEB	671	0	131	0	-.2377E+07	.0000
MAR	699	0	81	0	-.2377E+07	.0000
APR	533	0	0	0	-.2366E+07	.0000
MAY	398	0	0	0	-.1775E+07	.0000
JUN	146	0	0	0	-.6395E+06	.0000
JUL	77	0	0	0	-.5790E+06	.0000
AUG	72	0	0	0	-.4684E+06	.0000
SEP	272	0	0	0	-.1379E+07	.0000
OCT	552	0	0	0	-.2066E+07	.0000
NOV	666	0	39	0	-.2377E+07	.0000
DEC	738	0	205	0	-.2377E+07	.0000
YEAR	5568	0	614	0	-.2377E+07	.0000

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	1464.49	.00	4.16	11.89	2.71	38.27	12.1
FEB	1211.29	.00	3.76	10.74	2.45	34.57	12.1
MAR	1194.37	.00	4.16	11.89	2.61	37.95	12.1
APR	624.18	.00	4.03	11.51	2.44	36.41	12.1
MAY	338.60	.00	4.16	11.89	2.17	36.43	12.1
JUN	87.74	.00	4.03	11.51	1.89	34.55	12.1
JUL	46.66	.00	4.16	11.89	1.94	35.64	12.1
AUG	42.61	.00	4.16	11.89	2.06	36.06	12.1
SEP	241.89	.00	4.03	11.51	1.94	34.70	12.1
OCT	628.61	.00	4.16	11.89	2.42	37.29	12.1
NOV	970.77	.00	4.03	11.51	2.56	36.82	12.1
DEC	1446.04	.00	4.16	11.89	2.69	38.20	12.1
YEAR	8297.25	.00	48.98	140.03	27.87	436.88	12.1

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 438774. BTU/(SQFT-YEAR)

BLDG 826 - GYMNASIUM - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	158	.0000	-.2377E+07
FEB	1464.	929.	1.000	37.	0.	0.	0	131	.0000	-.2377E+07
MAR	1922.	1254.	1.000	43.	0.	0.	0	81	.0000	-.2377E+07
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.0000	-.2366E+07
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.0000	-.1775E+07
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	-.6395E+06
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	-.5790E+06
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	-.4684E+06
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	-.1379E+07
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.0000	-.2066E+07
NOV	1039.	732.	1.000	47.	0.	0.	0	39	.0000	-.2377E+07
DEC	883.	604.	1.000	35.	0.	0.	0	205	.0000	-.2377E+07

BUILDING MANAGER INTERVIEW

BUILDING INFORMATION:							
Building No:	826		Building Name: Gymnasium				
Surveyed by:	DMS		Date: 11/6/95		Building Use: Physical Fitness		
Building Contact:					Phone No:		
Building Contact:					Phone No:		
OCCUPANCY:							
Number of Employees:	Mon./Fri.:	5		Schedule:	530	To	2000
	Tues./Thurs	5			530	To	2000
	Wed.	5			530	To	2000
	Sat./Sun.	3			1300	To	1600
Visitors Per Day:	Mon./Fri.:	200		Schedule:	530	To	2000
	Tues./Thurs	200			530	To	2000
	Wed.	200			430	To	2000
	Sat./Sun.	200			1300	To	2000
Comments:							
LIGHTING SCHEDULE:							
Normal Occupancy:	Mon.-Fri.:			Schedule:	530	To	2000
	Sat./Sun.:				1300	To	2000
Cleaning Crew/2nd Shift:	Mon.-Fri.:			Schedule:		To	
	Sat./Sun.:					To	
EQUIPMENT SCHEDULE:							
Fan/AHU Schedule:	Mon.-Fri.:			Schedule:	0	To	2400
	Sat./Sun.:				0	To	2400
Chiller Schedule:	Mon.-Fri.:			Schedule:		To	
	Sat./Sun.:					To	
Boiler Schedule:	Mon.-Fri.:			Schedule:		To	
	Sat./Sun.:					To	
Aux. Equipment Schedule:							
Domestic HW	Mon.-Fri.:			Schedule:	0	To	2400
	Sat./Sun.:				0	To	2400
	Mon.-Fri.:			Schedule:		To	
	Sat./Sun.:					To	
Comments:							

Building No 826 **Building Name:** Gymnasium

BUILDING ENVELOPE

EXTERIOR WALLS

Wall Direction (N, E, W, or S)	Wall Construction No.	Comments
N	XW-1,-5	
E	XW-1,-5	
S	XW-1,-5	
W	XW-1,-5	
		GENERAL: Face Brick & CMU 12' A.F.F.,
		then insulated metal panel to roof
		(In Gymnasium Area)

LIST OF EXT. WALL CONSTRUCTION TYPES

Wall Construction No.	Description
XW-1	Face Brick & CMU
XW-2	Face Brick, CMU, & Gyp. Board
XW-3	Face Brick, CMU, & Ceramic Tile
XW-4	Face Brick, CMU, & Plaster Coat
XW-5	Insulated Metal Panel

WINDOWS

Window Direction (N, E, W, or S)	Window Construction No.	Comments
N		All windows are now covered with insulated
E		metal panels.
S		
W		

LIST OF WINDOW TYPES

Window Construction No.	Description
W-1	Double Pane Clear
W-2	Double Pane Tinted
W-3	Single Pane with Storm Windows
W-4	Single Pane

ROOF CONSTRUCTION

Roof Location	Roof Construction No.	Comments
ALL	R-7	

LIST OF ROOF CONSTRUCTION TYPES

Roof Construction No.	Description
R-1	BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile
R-2	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Ceiling Tile
R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Clg
R-4	BUR; Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plaster Clg.
R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceiling Tile
R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaster Clg.
R-7	BUR, Rigid Insul., Poured Gypsum Deck, 1" Form Board

Building No 826 Building Name: Gymnasium

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

INTERIOR EQUIPMENT AND OBJECTS

Wall Direction (N, E, W, or S)	Item No.	No. of Items	Comments
Gym Area			
N	A-5	1	Bleachers are 15' high A.F.F.
N	E-3	1	
N	A-7	1	Glazed structural block 5' A.F.F. in toilet room
N	M-6	1	
N	A-2	1	Wood (maple) walls & floor in raquetball court
S	A-6	1	Glazed structural block 4'-0" A.F.F. in locker rooms
S	M-4	2	
S	M-3	2	
S	E-4	1	
S	E-2	1	
S	A-8	1	
S	A-9	2	
S	A-10	2	
S	E-6	2	
W	E-5	1	
W	E-4	1	
W	E-3	1	
W	E-2	1	
W	E-6	1	
E	L-3	1	
E	E-6	2	
S	E-5	1	
S	E-6	1	
S	F-4	1	
			GENERAL: Concrete block 10' A.F.F. in basketball court area

LIST OF EQUIPMENT AND OBJECTS

Item No.	Description
	Architectural
A-1	Interior Partitions
A-2	Wood Wall
A-3	Drapery Valances
A-4	Drapery Rods
A-5	Bleachers
A-6	Lockers
A-7	Mirror
A-8	Score board
A-9	Basketball backboard and rim
A-10	Speakers
	Plumbing
P-1	Sinks
P-2	Commodes
P-3	Toilet Stalls
P-4	Water Fountains
	HVAC Mechanical
M-1	Floor Supply/Return Grilles
M-2	Ceiling Supply/Return Grilles
M-3	Finned-Tube Baseboard Radiators
M-4	Thermostats / Space Temp. Sensors
M-5	Wall mounted convection type heater
M-6	Fan Coil
	Electrical
E-1	Electrical Panels
E-2	Electrical Outlets
E-3	Electrical Light Switches
E-4	Electrican Conduit
E-5	Emergency light
E-6	Electrical Disconnect
	Lighting
L-1	Wall Mounted Fixtures
L-2	Ceiling Mounted Fixtures
L-3	Exit Signs
	Fire Protection
F-1	Alarm Pull Switches
F-2	Alarm Sound Devices (Speakers, Bells)
F-3	Sprinkler Heads
F-4	Fire Extinguishes
	Communication
C-1	Telephones - Wall Mounted
C-2	Telephones - Booth Mounted
C-3	Telephone Jacks

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE: **826HV1**

BLDG: **826**

AIR HANDLING UNIT SURVEY OBSERVATIONS

HV-1	AHU NO.	**MAIN GYM SE**	LOCATION (RM)
	REF. SYS. SERVING AHU	**MAIN GYM**	SERVES AREA

UNIT TYPE:

	SINGLE ZN		2-PIPE FC		4-PIPE FC		UNIT HTR	X	H&V
	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION		VAV
	NUMBER OF ZONES				OTHER				
	COMMENT:								

NAMEPLATE:

					MFG.				MODEL
1.5	SUPPLY FAN HP				MFG.				MODEL
	RET/EXH FAN HP				MFG.				MODEL
8500	CFM-HTG		CFM-CLG	0%	MIN %OA	100%	MAX %OA	20.0%	% HTG AREA SERVED
COMMENT:		**UNIT NOT ACCESSIBLE EXCEPT BY A VERY TALL LADDER**							

COILS:

X	NONE		STM		HW		ELEC		MOD VLV	PREHEAT
	NONE	X	STM		HW		ELEC	X	MOD VLV	HEATING
X	NONE		STM		HW		ELEC		MOD VLV	REHEAT
X	NONE		STM		HW		EVAP MEDIA		MOD VLV	HUMID.
X	NONE		DX		CW				MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	NO
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	1	1	1	1	1	1	1	1

CONTROLS:

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK			
SPACE SETPOINT (°F):	69	OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Y	MAX OA (Y/N)	Y	RA (Y/N)		EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:		YES	X	NO					
COMMENTS:	**T-STAT COVERS LOCKED**								

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE: **826HV2**

BLDG: **826**

AIR HANDLING UNIT SURVEY OBSERVATIONS

HV-2	AHU NO.	**MAIN GYM SW**	LOCATION (RM)
	REF. SYS. SERVING AHU	**MAIN GYM**	SERVES AREA

UNIT TYPE:

	SINGLE ZN		2-PIPE FC		4-PIPE FC		UNIT HTR	X	H&V
	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION		VAV
	NUMBER OF ZONES				OTHER				
	COMMENT:								

NAMEPLATE:

					MFG.				MODEL
1.5	SUPPLY FAN HP				MFG.				MODEL
	RET/EXH FAN HP				MFG.				MODEL
8500	CFM-HTG		CFM-CLG	0%	MIN %OA	100%	MAX %OA	20.0%	% HTG AREA SERVED
COMMENT:	**UNIT NOT ACCESSIBLE EXCEPT BY A VERY TALL LADDER**								

COILS:

X	NONE		STM		HW		ELEC		MOD VLV	PREHEAT
	NONE	X	STM		HW		ELEC	X	MOD VLV	HEATING
X	NONE		STM		HW		ELEC		MOD VLV	REHEAT
X	NONE		STM		HW		EVAP MEDIA		MOD VLV	HUMID.
X	NONE		DX		CW				MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	**NO**
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	1	1	1	1	1	1	1	1

CONTROLS:

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK			
SPACE SETPOINT (°F):	69	OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Y	MAX OA (Y/N)	Y	RA (Y/N)		EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:		YES	X	NO					
COMMENTS:	**T-STAT COVERS LOCKED**								

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
BLDG: **826**
FILE: **826HV3**

AIR HANDLING UNIT SURVEY OBSERVATIONS

HV-3	AHU NO.	**MAIN GYM NE**	LOCATION (RM)
	REF. SYS. SERVING AHU	**MAIN GYM**	SERVES AREA

UNIT TYPE:

	SINGLE ZN		2-PIPE FC		4-PIPE FC		UNIT HTR	X	H&V
	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION		VAV
	NUMBER OF ZONES				OTHER				
	COMMENT:								

NAMEPLATE:

					MFG.				MODEL
1.5	SUPPLY FAN HP				MFG.				MODEL
	RET/EXH FAN HP				MFG.				MODEL
8500	CFM-HTG		CFM-CLG	0%	MIN %OA	100%	MAX %OA	20.0%	% HTG AREA SERVED
COMMENT:		**UNIT NOT ACCESSIBLE EXCEPT BY A VERY TALL LADDER**							

COILS:

X	NONE		STM		HW		ELEC		MOD VLV	PREHEAT
	NONE	X	STM		HW		ELEC	X	MOD VLV	HEATING
X	NONE		STM		HW		ELEC		MOD VLV	REHEAT
X	NONE		STM		HW		EVAP MEDIA		MOD VLV	HUMID.
X	NONE		DX		CW				MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	NO
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	1	1	1	1	1	1	1	1

CONTROLS:

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK			
SPACE SETPOINT (°F):	69	OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Y	MAX OA (Y/N)	Y	RA (Y/N)		EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:		YES	X	NO					
COMMENTS:	**T-STAT COVERS LOCKED**								

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD
BLDG: **826**

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE: **826HV4**

AIR HANDLING UNIT SURVEY OBSERVATIONS

HV-4	AHU NO.	**MAIN GYM NW**	LOCATION (RM)
	REF. SYS. SERVING AHU	**MAIN GYM**	SERVES AREA

UNIT TYPE:

	SINGLE ZN		2-PIPE FC		4-PIPE FC		UNIT HTR	X	H&V
	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION		VAV
	NUMBER OF ZONES				OTHER				
	COMMENT:								

NAMEPLATE:

					MFG.				MODEL
1.5	SUPPLY FAN HP				MFG.				MODEL
	RET/EXH FAN HP				MFG.				MODEL
8500	CFM-HTG		CFM-CLG	0%	MIN %OA	100%	MAX %OA	20.0%	% HTG AREA SERVED
COMMENT:		**UNIT NOT ACCESSIBLE EXCEPT BY A VERY TALL LADDER**							

COILS:

X	NONE		STM		HW		ELEC		MOD VLV	PREHEAT
	NONE	X	STM		HW		ELEC	X	MOD VLV	HEATING
X	NONE		STM		HW		ELEC		MOD VLV	REHEAT
X	NONE		STM		HW		EVAP MEDIA		MOD VLV	HUMID.
X	NONE		DX		CW				MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	NO
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	1	1	1	1	1	1	1	1

CONTROLS:

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK			
SPACE SETPOINT (°F):	69	OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Y	MAX OA (Y/N)	Y	RA (Y/N)		EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:		YES	X	NO					
COMMENTS:	**T-STAT COVERS LOCKED**								

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE: **826HV5**

BLDG: **826**

AIR HANDLING UNIT SURVEY OBSERVATIONS

HV-5	AHU NO.	**EXERCISE RM.**	LOCATION (RM)
	REF. SYS. SERVING AHU	**EXERCISE RM. / HANDBALL**	SERVES AREA

UNIT TYPE:

	SINGLE ZN		2-PIPE FC		4-PIPE FC		UNIT HTR	X	H&V
	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION		VAV
	NUMBER OF ZONES				OTHER				
	COMMENT:								

NAMEPLATE:

					MFG.				MODEL
1.5	SUPPLY FAN HP				MFG.				MODEL
	RET/EXH FAN HP				MFG.				MODEL
8500	CFM-HTG		CFM-CLG	0%	MIN %OA	100%	MAX %OA	20.0%	% HTG AREA SERVED
COMMENT:		**UNIT NOT ACCESSIBLE EXCEPT BY A VERY TALL LADDER**							

COILS:

X	NONE		STM		HW		ELEC		MOD VLV	PREHEAT
	NONE	X	STM		HW		ELEC	X	MOD VLV	HEATING
X	NONE		STM		HW		ELEC		MOD VLV	REHEAT
X	NONE		STM		HW		EVAP MEDIA		MOD VLV	HUMID.
X	NONE		DX		CW				MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	NO
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	1	1	1	1	1	1	1	1

CONTROLS:

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK			
SPACE SETPOINT (°F):	72	OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Y	MAX OA (Y/N)	Y	RA (Y/N)		EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:		YES	X	NO					
COMMENTS:	**T-STAT COVERS LOCKED**								

ANNUAL ENERGY SAVINGS SUMMARY FOR ADMINISTRATION/SUPPLY BUILDINGS - BLDGS 626, 633, 655, 656, 733, 734, 751, 752, 823, 824, 840, 841, 1006, 1007, & 1025

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Baseline Annual Electric (MBtu)	ECO 1 - Annual Electric (MBtu)	Annual Electric Energy Savings (MBtu)	Baseline Peak Electric Demand (kW)	ECO 1 - Peak Electric Demand (kW)	Peak Electric Demand Savings (kW)	Baseline Nat. Gas Energy Savings (MBtu)	ECO 1 - Annual Nat. Gas (MBtu)	Annual Nat. Gas Energy Savings (MBtu)
655	0.00	0.00	0.00	11.30	11.30	0.00	918.05	795.66	122.39

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 655 (SF)	Square Foot Adjust-ment Factor	Annual Electric Energy Savings (MBtu)	Adjusted Annual Electric Energy Savings* (MBtu)	Peak Electric Demand Savings (kW)	Adjusted Peak Electric Demand Savings* (kW)	Annual Nat. Gas Energy Savings (MBtu)	Adjusted Annual Nat. Gas Energy Savings* (MBtu)
626	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
633	12,134	12,134	1.000	0.00	0.00	0.00	0.00	122.39	122.39
656	12,134	12,134	1.000	0.00	0.00	0.00	0.00	122.39	122.39
733	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
734	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
751	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
752	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
823	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
824	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
840	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
841	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
1006	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
1007	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
1025	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60

*Energy savings prorated on a square foot basis

ANNUAL ENERGY SAVINGS SUMMARY FOR ADMINISTRATION/SUPPLY BUILDINGS - BLDGS 626, 633, 655, 656, 733, 734, 751, 752, 823, 824, 840, 841, 1006, 1007, & 1025

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Baseline Annual Electric (MBtu)	ECO 2 - Annual Electric (MBtu)	Annual Electric Energy Savings (MBtu)	Baseline Peak Electric Demand (kW)	ECO 2 - Peak Electric Demand (kW)	Peak Electric Demand Savings (kW)	Baseline Annual Nat. Gas (MBtu)	ECO 2 - Annual Nat. Gas (MBtu)	Annual Nat. Gas Energy Savings (MBtu)
655	0.00	0.00	0.00	11.30	11.30	0.00	918.05	790.16	127.89

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 655 (SF)	Square Foot Adjust-ment Factor	Annual Electric Energy Savings (MBtu)	Adjusted Annual Electric Energy Savings* (MBtu)	Peak Electric Demand Savings (kW)	Adjusted Peak Electric Demand Savings* (kW)	Annual Nat. Gas Energy Savings (MBtu)	Adjusted Annual Nat. Gas Energy Savings* (MBtu)
626	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
633	12,134	12,134	1.000	0.00	0.00	0.00	0.00	127.89	127.89
656	12,134	12,134	1.000	0.00	0.00	0.00	0.00	127.89	127.89
733	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
734	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
751	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
752	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
823	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
824	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
840	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
841	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
1006	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
1007	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
1025	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11

*Energy savings prorated on a square foot basis

INVESTMENT COST SUMMARY
FOR ADMINISTRATION/SUPPLY BUILDINGS - BLDGS 626, 633, 655, 656, 733, 734, 751, 752, 823, 824, 840, 841, 1006, 1007, & 1025

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Investment Cost ($)
655	$50,994

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 655 (SF)	Square Foot Adjust-ment Factor	Investment Cost ($)	Adjusted Investment Cost ($)*
626	12,155	12,134	1.002	$50,994	$51,082
633	12,134	12,134	1.000	$50,994	$50,994
656	12,134	12,134	1.000	$50,994	$50,994
733	12,155	12,134	1.002	$50,994	$51,082
734	12,155	12,134	1.002	$50,994	$51,082
751	12,155	12,134	1.002	$50,994	$51,082
752	12,155	12,134	1.002	$50,994	$51,082
823	12,155	12,134	1.002	$50,994	$51,082
824	12,155	12,134	1.002	$50,994	$51,082
840	12,154	12,134	1.002	$50,994	$51,078
841	12,155	12,134	1.002	$50,994	$51,082
1006	12,155	12,134	1.002	$50,994	$51,082
1007	12,155	12,134	1.002	$50,994	$51,082
1025	12,155	12,134	1.002	$50,994	$51,082

*Investment Cost prorated on a square foot basis

INVESTMENT COST SUMMARY
FOR ADMINISTRATION/SUPPLY BUILDINGS - BLDGS 626, 633, 655, 656, 733, 734, 751, 752, 823, 824, 840, 841, 1006, 1007, & 1025

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Investment Cost ($)
655	$52,484

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 655 (SF)	Square Foot Adjust-ment Factor	Investment Cost ($)	Adjusted Investment Cost ($)*
626	12,155	12,134	1.002	$52,484	$52,575
633	12,134	12,134	1.000	$52,484	$52,484
656	12,134	12,134	1.000	$52,484	$52,484
733	12,155	12,134	1.002	$52,484	$52,575
734	12,155	12,134	1.002	$52,484	$52,575
751	12,155	12,134	1.002	$52,484	$52,575
752	12,155	12,134	1.002	$52,484	$52,575
823	12,155	12,134	1.002	$52,484	$52,575
824	12,155	12,134	1.002	$52,484	$52,575
840	12,155	12,134	1.002	$52,484	$52,575
841	12,155	12,134	1.002	$52,484	$52,575
1006	12,155	12,134	1.002	$52,484	$52,575
1007	12,155	12,134	1.002	$52,484	$52,575
1025	12,155	12,134	1.002	$52,484	$52,575

*Investment Cost prorated on a square foot basis

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Leonard Wood	REGION: 2 (Missouri)		PROJECT NO:	1406-011
PROJECT TITLE:	Limited Energy Study, Insulate Brick Buildings			FISCAL YEAR:	1996
ANALYSIS DATE:	02/18/96	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz

1. INVESTMENT: **BLDG 655 - INSTALL 3.5" BATT INSULATION ON WALLS**

A.	CONSTRUCTION COST	=	$45,127	
B.	SIOH COST	(7.0% of 1A) =	$3,159	
C.	DESIGN COST	(6.0% of 1A) =	$2,708	
D.	TOTAL COST	(1A +1B +1C) =	$50,994	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT	=	$0	
F.	PUBLIC UTILITY COMPANY REBATE	=	$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$50,994

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96

	ENERGY SOURCE	FUEL COS $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$7.33	0	$0	15.88	$0	
B.	DIST	$0.00	0	$0		$0	
C.	NAT GAS	$5.30	122.39	$649	18.30	$11,871	
D.	COAL	$0.00	0	$0		$0	
E.	ELEC. DEMAND			$0	13.47	$0	
F.	TOTAL		122.39	$649		-------->	$11,871

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1	ANNUAL MAINTENANCE	$0	$0
2		$0	$0
3		$0	$0
4	TOTAL ANNUAL DISC. SAVINGS (+) / COST	$0	$0

B. NON-RECURRING (+/-)

ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)
a. BASELINE EQUIP. REPLCMNT.				$0
b.				$0
c.				$0
d.				$0
e.				$0
f. TOTAL	$0			$0

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = $0

4.	FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-)	(2F3 + 3A4 + (3Bf1/Economic Life))	$649
5.	SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY)	(1G/4) =	78.61
6.	TOTAL NET DISCOUNTED SAVINGS	(2F5 + 3C) =	$11,871
7.	DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (MUST HAVE SIR > 1.25 TO QUALIFY)	(6/1G) =	0.23

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	SHEET 1 OF 1	
ENGINEER	E M C Engineers, Inc.	DATE PREPARED	18-Feb-96
	Denver, CO	ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST Quantity	Unit Cost	Total	LABOR COST Crew/ Worker	Hours/ Unit	Total	TOTAL
1		**BUILDING 655**								
2		**INSTALL 3.5" BATT INSULATION ON WALLS**								
3										
4										
5	I3-1/2I	INSTALL 3-1/2" BATT INSULATION	S.F.	5654.0	$0.18	$1,025	1-CARP	0.007	$1,040	$2,065
6	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	5654.0	$0.20	$1,133	2-CARP	0.017	$5,051	$6,183
7	ISW	INSTALL 2"x4" STUDDED WALL 2' OC	L.F.	4821.0	$0.24	$1,136	F-2	0.009	$2,391	$3,527
8	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	5654.0	$0.07	$378	1-PORD	0.01	$1,365	$1,742
9	R12WMH	RELOCATE 12' BASEBOARD RADIATION	EA.	25.0	$18.39	$460	Q-6	5.25	$11,480	$11,940
10	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	3.0	$8.82	$26	1-ELEC	0.844	$77	$104
11	REO	RELOCATE ELECTRICAL OUTLET	EA.	15.0	$7.97	$119	1-ELEC	0.896	$409	$529
12	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	L.F.	266.0	$1.14	$305	1-CARP	0.134	$936	$1,241
13	RDR	RELOCATE DRAPERIES, WINDOW SHADES	EA.	15.0	$0.00	$0	L-2	0.744	$518	$518
14	RWPL	RELOCATE WALL PLACARD	EA.	10.0	$0.00	$0	1-CARP	0.654	$172	$172
15	RFE	RELOCATE FIRE EXTINGUISHER	EA.	5.0	$0.00	$0	1-CARP	0.2	$26	$26
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27		**SUBTOTAL**				$4,581			$23,465	$28,047
28	DIFF	DIFFICULTLY FACTOR			5%				$1,173	$1,173
29		**SUBTOTAL**				$4,581			$24,638	$29,220
30	OH	OVERHEAD			17%	$779			$4,189	$4,967
31		**SUBTOTAL**				$5,360			$28,827	$34,187
32	PRO	PROFIT			10%	$536			$2,883	$3,419
33		**SUBTOTAL**				$5,896			$31,710	$37,606
34	CONT	CONTINGENCY			20%	$1,179			$6,342	$7,521
35	**TOTAL COST**					$7,076			$38,052	$45,127

LIFE CYCLE COST ANALYSIS SUMMARY

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Leonard Wood	REGION: 2 (Missouri)		PROJECT NO:	1406-011
PROJECT TITLE:	Limited Energy Study, Insulate Brick Buildings			FISCAL YEAR:	1996
ANALYSIS DATE:	02/18/96	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz

1. INVESTMENT: **BLDG 655 - INSTALL 1.5" RIGID INSULATION ON WALLS**

A.	CONSTRUCTION COST	=	$46,446	
B.	SIOH COST	(7.0% of 1A) =	$3,251	
C.	DESIGN COST	(6.0% of 1A) =	$2,787	
D.	TOTAL COST	(1A +1B +1C) =	$52,484	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT	=	$0	
F.	PUBLIC UTILITY COMPANY REBATE	=	$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$52,484

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96

	ENERGY SOURCE	FUEL COS $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$7.33	0	$0	13.80	$0	
B.	DIST	$0.00	0	$0	0.00	$0	
C.	NAT GAS	$5.30	127.89	$678	17.76	$12,038	
D.	COAL	$0.00	0	$0	0.00	$0	
E.	ELEC. DEMAND			$0	13.47	$0	
F.	TOTAL		127.89	$678		-------->	$12,038

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1	ANNUAL MAINTENANCE	$0	$0
2		$0	$0
3		$0	$0
4	TOTAL ANNUAL DISC. SAVINGS (+) / COST	$0	$0

B. NON-RECURRING (+/-)

ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)
a. BASELINE EQUIP. REPLCMNT.				$0
b.				$0
c.				$0
d.				$0
e.				$0
f. TOTAL	$0			$0

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = $0

4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3+3A4+(3Bf1/Economic Life)) $678

5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = 77.43

6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) = $12,038

7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.23
   (MUST HAVE SIR > 1.25 TO QUALIFY)

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	SHEET 1	OF 1
ENGINEER	E M C Engineers, Inc. Denver, CO	DATE PREPARED	18-Feb-96
		ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST Quantity	Unit Cost	Total	LABOR COST Crew/ Worker	Hours/ Unit	Total	TOTAL
1		**BUILDING 655**								
2		**INSTALL 1.5" RIGID INSULATION ON WALLS**								
3										
4										
5	I1-1/2RI	INSTALL 1-1/2" RIGID INSULATION	S.F.	5654.0	$0.59	$3,344	1-CARP	0.008	$1,188	$4,533
6	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	5654.0	$0.20	$1,133	2-CARP	0.017	$5,051	$6,183
7	IFS	INSTALL 3/4"x2" FURRING STRIPS	L.F.	3204.0	$0.19	$611	1-CARP	0.016	$1,347	$1,958
8	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	5654.0	$0.07	$378	1-PORD	0.01	$1,365	$1,742
9	R12WMH	RELOCATE 12' BASEBOARD RADIATION	EA.	25.0	$18.39	$460	Q-6	5.25	$11,480	$11,940
10	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	3.0	$8.82	$26	1-ELEC	0.844	$77	$104
11	REO	RELOCATE ELECTRICAL OUTLET	EA.	15.0	$7.97	$119	1-ELEC	0.896	$409	$529
12	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	L.F.	266.0	$1.14	$305	1-CARP	0.134	$936	$1,241
13	RDR	RELOCATE DRAPERIES, WINDOW SHADES	EA.	15.0	$0.00	$0	L-2	0.744	$518	$518
14	RWPL	RELOCATE WALL PLACARD	EA.	10.0	$0.00	$0	1-CARP	0.654	$172	$172
15	RFE	RELOCATE FIRE EXTINGUISHER	EA.	5.0	$0.00	$0	1-CARP	0.2	$26	$26
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27		**SUBTOTAL**				$6,376			$22,569	$28,946
28	DIFF	DIFFICULTLY FACTOR			5%				$1,128	$1,128
29		**SUBTOTAL**				$6,376			$23,698	$30,074
30	OH	OVERHEAD			17%	$1,084			$4,029	$5,113
31		**SUBTOTAL**				$7,460			$27,727	$35,187
32	PRO	PROFIT			10%	$746			$2,773	$3,519
33		**SUBTOTAL**				$8,206			$30,499	$38,705
34	CONT	CONTINGENCY			20%	$1,641			$6,100	$7,741
35	**TOTAL COST**					$9,847			$36,599	$46,446

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT LEONARD WOOD, MO.

DATE: Feb-96
BY: DMS
JOB: 1406.011
CHK: AJN
FILE: 655BHL

BUILDING HEATING LOAD CALCULATION SHEET

BLDG NO: 655 BLDG NAME: ADMINISTRATION / SUPPLY
BLDG FUNCTION: COMPANY ADMINISTRATION / SUPPLY
FLOOR AREA: (SQ. FT) 11,861 # FLOORS 1
SLAB PERIMETER: (FT) 509

I. AREAS: ([ ] FIELD VERIFIED ELEVATION PLANS)

		NORTH	SOUTH	EAST	WEST	TOTAL
WALLS, GROSS	(SQ. FT)	2,859	3,278	729	476	7,342
GLASS	(SQ. FT)	310	976	0	0	1,286
PERSONNEL DOOR	(SQ. FT)	297	105	0	0	402
OVERHEAD DOOR	(SQ. FT)	0	0	0	0	0
WALLS, NET	(SQ. FT)	2,252	2,197	729	476	5,654
ROOF AREA (OR CEILING AREA IF ATTIC IS UNCONDITIONED)					(SQ. FT)	11,869
OVERHEAD DOOR	(SQ. FT)	0	PERSONNEL DOOR		(SQ. FT)	402
BASEMENT WALLS	(SQ. FT)	0	0	0	0	0

II. CONSTRUCTION: ([ ] FIELD VERIFIED WALL, ROOF, WINDOW, DOOR TYPES)

WALLS: (SKETCH CROSS SECTION OF WALL)

	COMPONENTS	R-VALUE
1.	OUTSIDE AIR FILM	0.17
2.	4" FACE BRICK	0.43
3.	AIR SPACE	0.91
4.	6" CMU	1.89
5.		
6.		
7.	INSIDE AIR FILM	0.68
	TOTAL R-WALL =	4.08
	U = 1/R	0.245

ROOF: (SKETCH CROSS SECTION OF ROOF)

STORAGE AREA (7674 SF)		*ADMIN AREA (4187 SF)*	
OUTSIDE AIR FILM	0.17	OUTSIDE AIR FILM	0.17
BUILT UP ROOF	0.34	BUILT UP ROOF	0.34
2" RIGID INSULATION	8.00	2" RIGID INSULATION	8.00
METAL ROOF DECK	0.00	CEILING AIR SPACE	1.00
6" BATT INSULATION	19.00	CEILING TILE	1.20
		CEILING AIR SPACE	1.00
INSIDE AIR FILM	0.68	ACOUSTIC TILE	1.35
R-value	28.19	INSIDE AIR FILM	0.68
		R-value	13.57

	COMPONENTS	R-VALUE
1.	STORAGE AREA	28.19
2.	ADMIN AREA	13.57
3.		
4.		
5.		
6.		
7.		
	AVG. R-ROOF =	23.02
	U = 1/R	0.043

GLASS TYPE:	PPG 'PENNVERNON' C.L. TWNDV, SSA, .88 S.C.	R-GLASS	1.61
SLAB TYPE FLOOR:	4" CONCRETE	SLF	0.83
BASEMENT TYPE:	NONE	R-BASEM.	0.00
OVERHEAD DOOR TYPE:	NONE	R-ODOOR	0.00
PERSONNEL DOOR TYPE:	METAL	R-PDOOR	2.56

III. INFILTRATION:

TIGHT WALL H/M/L (SQ.FT.)		X CFM / SQ.FT.	0.000	=	0
AVG. WALL H/M/L (SQ.FT.)	M 7342	X CFM / SQ.FT.	0.115	=	844
LEAKY WALL H/M/L (SQ.FT.)		X CFM / SQ.FT.	0.000	=	0
DOOR OPENINGS / HR - SINGLE DOOR	15	X CFM /OPENING /HR	1.600	=	24
DOOR OPENINGS / HR - DOUBLE DOORS	20	X CFM /OPENING /HR	1.385	=	28
		TOTAL INFILTRATION (CFM)		=	896

UA ODOOR	=	ODOOR AREA	0	X DOOR "U"	0.000	=	0
UA PDOOR	=	PDOOR AREA	402	X DOOR "U"	0.391	=	157
UA WALL	=	WALL AREA	5,654	X WALL "U"	0.245	=	1,385
UA ROOF	=	ROOF AREA	11,869	X ROOF "U"	0.043	=	516
UA GLASS	=	GLASS AREA	1,286	X GLASS "U"	0.621	=	799
UA SLAB	=	SLAB PERIM.	509	X SLF	0.830	=	422
UA BASEM.	=	B-WALL AREA	0	X BASE. "U"	0.000	=	0
INFILTRATION	=	CFM	896	X A. T. F.	1.035	=	927
				TOTAL UA (BTU/HR°F)			4,206

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 655.XLS
BLDG: **655** ZONE:

Rates of Heat Gain from Occupants of Conditioned Spaces

Zone No.	No. of People	Activ. Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)
0	40	2	Seated very light work (writing)	Offices, hotels, apts	245	155	9,800	6,200
	0	0					0	0
	0	0					0	0
TOTAL	40					**TOTAL**	9,800	6,200

Peak Wattage Value for Lights

Zone No.	No. of Fixtures	Fixture Type	Description	Watts/ Fixture	Total Wattage
0	45	20	Incandescent - 100w	100	4,500
	31	18	Incandescent - 60w	60	1,860
	14	4	Fluorescent, 4 - 40w lamps, 2 - 16w ballasts (2x4 ft. fix.)	192	2,688
	36	17	Fluorescent, 2 - 40w lamps, 16w ballasts (2x2 ft. fix.)	56	2,016
	2	2	Fluorescent, 2 - 40w lamps, 16w ballast (1x4 ft. fixture)	96	192
			0	0	0
			0	0	0
		0	0	0	0
TOTAL	128			**TOTAL**	11,256

Peak Value for Internal Gains

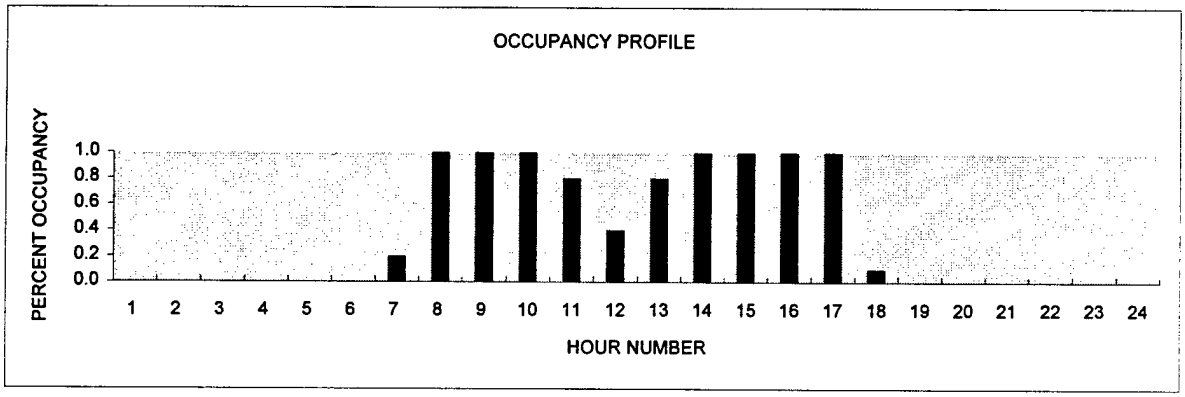
Zone No.	No. of Equip.	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattage	Total (BTU)
0	10	8	Terminal	145	90%	1,450	4,949
	10	5	Printer (laser)	870	34%	8,700	29,693
	5	56	Refrigerator/Freezer(Frostless 14 cu. ft.)	615	35%	3,075	10,495
	5	12	Typewriter	100	10%	500	1,707
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
				TOTAL	40%	13,725	46,843

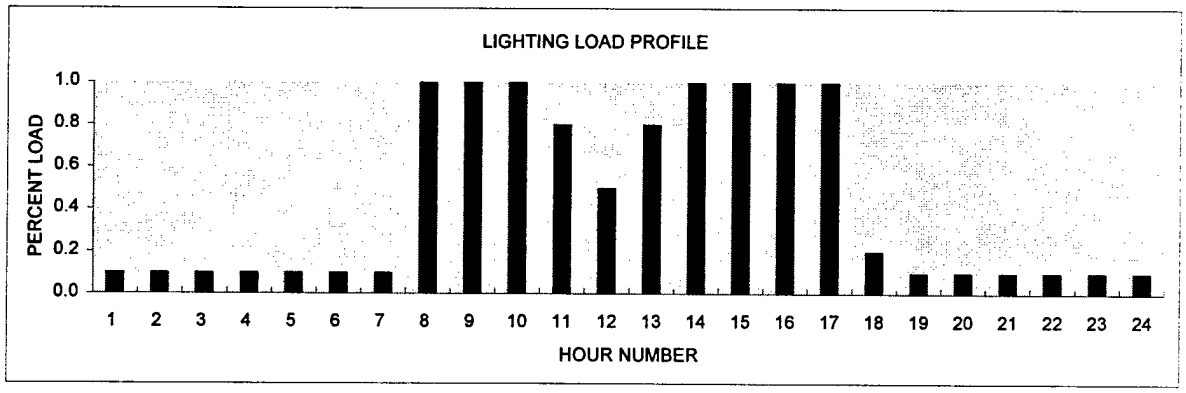
EMC Engineers, Inc.

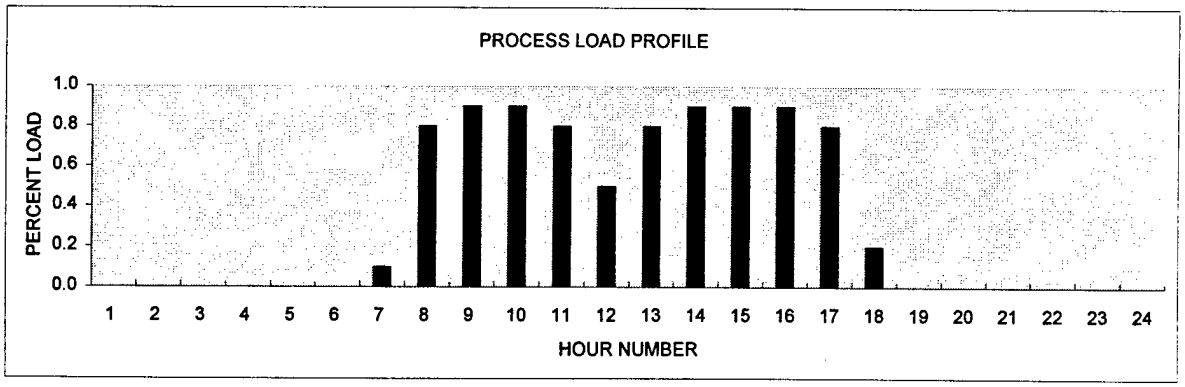
PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 655.XLS
BLDG: 655
ZONE: 0

BLD TYPE	BLDG FUNCTION	TYPE OF PROFILE	HOUR NUMBER																							
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
3	Administration	OCCUPANCY	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.0	1.0	1.0	0.8	0.4	0.8	1.0	1.0	1.0	1.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
		LIGHTING	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.0	1.0	1.0	0.8	0.5	0.8	1.0	1.0	1.0	1.0	0.2	0.1	0.1	0.1	0.1	0.1	0.1
		PROCESS	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.9	0.9	0.8	0.5	0.8	0.9	0.9	0.9	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0







```
BLDG 655 - ADMINISTRATION / SUPPLY   BASELINE
----------  PROGRAM CONTROL OPTIONS -----------
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)            0
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)            0
WEEKEND INTERNAL GAINS FACTOR (WKEND)    6.000000E-01
LAST CASE FLAG (1=YES, 0=NO)  (LSTCS)            1
SKY CLEARNESS FACTOR (CLN)        1.000000
NUMBER OF ZONES (NZ)            1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)            0
--------- SITE AND BUILDING DATA --------------
******REAL WEATHER FROM DISK*******
 FILE NAME MO
STATION 13995   YEAR 1955
SITE LATITUDE DEG (AL1)        37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)      1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)        56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN)        20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA)     6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF)     3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG)     2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO)        70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)        70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS)         1.000000
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW)    0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS)    146321.000000
FLOOR AREA (SQFT)     11861.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX)    493300.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX)     0.000000E+00
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA)    118610.000000
CONSTANT INFILTRATION RATE CFM (CFMI)       896.000000
INFILTRATION PROFILE
 1.00      1.00      1.00      1.00      1.00      1.00      1.00      1.00
 1.00      1.00      1.00      1.00      1.00      1.00      1.00      1.00
 1.00      1.00      1.00      1.00      1.00      1.00      1.00      1.00
A FACTOR IN INFILTRATION EQUATION (CINA)     3.670000E-01
B FACTOR IN INFILTRATION EQUATION (CINB)     2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC)     8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP)     22638.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF)     0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF)       442.000000
PARTITION UA BTU/HR-F (GUA)     0.000000E+00
DOOR UA BTU/HR-F (DUA)       157.000000
WINDOW GLASS NUMBER (NG)           30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO)     6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN)     6.930472E-01
WINDOW SHADING FACTOR (SHD)     5.900000E-01
```

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	2197.0	476.0	2252.0	729.0
WINDOW AREA SQFT (AWND)	976.0	.0	310.0	.0
WINDOW HEIGHT FT (WNDH)	10.0	.0	10.0	.0
WINDOW WIDTH FT (WNDW)	97.6	.0	31.0	.0
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.245	.245	.245
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01837	.01837	.01837	.01837
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00003	.00003	.00003	.00003
N=2	.00283	.00283	.00283	.00283
N=3	.01017	.01017	.01017	.01017
N=4	.00498	.00498	.00498	.00498
N=5	.00037	.00037	.00037	.00037
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	-.07415	-.07415	-.07415	-.07415
N=5	.00212	.00212	.00212	.00212
N=6	********	********	********	********

ROOF AREA SQFT (AROF) 11869.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 4.300000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 2.287010E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .211E-05 .316E-04 .104E-03 .780E-04 .148E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.000000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	18737.	9800.	6200.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	.0
2	.100	.000	.000	.000	70.0	.0
3	.100	.000	.000	.000	70.0	.0
4	.100	.000	.000	.000	70.0	.0
5	.100	.000	.000	.000	70.0	.0
6	.100	.000	.000	.000	70.0	.0
7	.100	.100	.200	.200	70.0	.0
8	1.000	.800	1.000	1.000	70.0	.0

```
  9        1.000      .900      1.000      1.000        70.0         .0
 10        1.000      .900      1.000      1.000        70.0         .0
 11         .800      .800       .800       .800        70.0         .0
 12         .500      .700       .400       .400        70.0         .0
 13         .800      .800       .800       .800        70.0         .0
 14        1.000      .900      1.000      1.000        70.0         .0
 15        1.000      .900      1.000      1.000        70.0         .0
 16        1.000      .900      1.000      1.000        70.0         .0
 17        1.000      .800      1.000      1.000        70.0         .0
 18         .200      .200       .100       .100        70.0         .0
 19         .100      .000       .000       .000        70.0         .0
 20         .100      .000       .000       .000        70.0         .0
 21         .100      .000       .000       .000        70.0         .0
 22         .100      .000       .000       .000        70.0         .0
 23         .100      .000       .000       .000        70.0         .0
 24         .100      .000       .000       .000        70.0         .0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)      68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)     100.000000
SYSTEM TYPE, (IECN)          2
SUPPLY AIR CFM (SACFM)   0.000000E+00
ECONOMIZER HIGH TEMP LIMIT F      100.000000
SYSTEM SUPPLY AIR START TIME HR    0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR       24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)      55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)    0.000000E+00
FAN EFFICIENCY (EFAN)    1.000000E-05
FAN TOTAL PRESSURE IN. WATER  (DP)    0.000000E+00
HEATING PLANT RATED OUTPUT BTU (HFLOT)  493300.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   616625.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)           4
COOLING PLANT RATED OUTPUT BTU (CFLOT)    1.000000E-10
COOLING PLANT RATED INPUT BTU (CFLIN)    0.000000E+00
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 655 - ADMINISTRATION / SUPPLY BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	22.	0.	0.	0.	0.	0.	0.	0.
	-126.	LOSS		-3.	-16.	0.	-29.	-18.	-100.	0.
FEB	.00	GAIN	24.45	.00	.00	.00	.01	.00	.00	.00
	-98.95	LOSS		-2.23	-13.66	.00	-22.36	-15.48	-86.08	.00
MAR	.00	GAIN	30.26	.00	.00	.00	.25	.00	.00	.00
	-80.07	LOSS		-2.06	-13.24	.00	-18.46	-14.99	-79.94	.00
APR	.00	GAIN	28.94	.00	.00	.00	.80	.00	.00	.00
	-36.46	LOSS		-1.36	-9.25	.00	-10.05	-10.54	-52.30	.00
MAY	.00	GAIN	30.73	.00	.01	.00	1.26	.01	.03	.00
	-12.10	LOSS		-1.05	-7.97	.00	-6.48	-8.74	-38.17	.00
JUN	.00	GAIN	31.57	.00	.01	.00	1.76	.01	.05	.00
	-2.00	LOSS		-.83	-6.87	.00	-4.33	-7.59	-33.15	.00
JUL	.00	GAIN	31.90	.00	.05	.00	1.89	.06	.25	.00
	-.78	LOSS		-.80	-6.85	.00	-4.29	-7.62	-33.44	.00
AUG	.00	GAIN	27.60	.00	.02	.00	1.58	.02	.09	.00
	-1.30	LOSS		-.81	-6.52	.00	-4.65	-7.14	-30.09	.00
SEP	.00	GAIN	25.90	.00	.04	.00	1.02	.04	.17	.00
	-12.05	LOSS		-1.01	-6.82	.00	-6.30	-7.65	-34.86	.00
OCT	.00	GAIN	24.09	.00	.00	.00	.16	.00	.01	.00
	-33.18	LOSS		-1.47	-8.75	.00	-11.49	-9.68	-44.45	.00
NOV	.00	GAIN	20.95	.00	.00	.00	.01	.00	.00	.00
	-63.63	LOSS		-1.86	-10.89	.00	-17.76	-12.08	-59.74	.00
DEC	0.	GAIN	20.	0.	0.	0.	0.	0.	0.	0.
	-123.	LOSS		-3.	-16.	0.	-29.	-17.	-95.	0.
TOT	0.	GAIN	318.	0.	0.	0.	9.	0.	1.	0.
	-589.	LOSS		-19.	-122.	0.	-165.	-137.	-688.	0.

MAX HEATING LOAD= -478803. BTUH ON DEC 18 HOUR 4 AMBIENT TEMP 1.
MAX COOLING LOAD= 0. BTUH ON DEC 31 HOUR 24 AMBIENT TEMP 42.

ZONE UA BTU/HR-F 2849.9

BLDG 655 - ADMINISTRATION / SUPPLY BASELINE

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	85.		5	16	61.	3.32	11.33	.00	18.39
			69.	27	6	4.				
FEB	71.	87.		13	16	68.	2.96	10.11	.00	16.40
			69.	2	6	14.				
MAR	73.	104.		28	16	76.	3.27	11.17	.00	18.12
			69.	3	6	15.				
APR	77.	108.		30	16	84.	3.15	10.76	.00	17.46
			69.	9	5	30.				
MAY	83.	114.		29	16	85.	3.32	11.33	.00	18.39
			69.	11	5	39.				
JUN	89.	118.		29	16	87.	3.15	10.76	.00	17.46
			70.	17	5	56.				
JUL	93.	124.		31	16	95.	3.27	11.17	.00	18.12
			70.	10	5	57.				
AUG	91.	119.		29	16	95.	3.32	11.33	.00	18.39
			70.	25	6	51.				
SEP	84.	117.		7	16	86.	3.10	10.60	.00	17.20
			70.	15	6	39.				
OCT	77.	112.		4	16	81.	3.32	11.33	.00	18.39
			69.	28	6	33.				
NOV	73.	100.		8	16	75.	3.20	10.92	.00	17.72
			69.	3	6	18.				
DEC	70.	85.		23	16	67.	3.22	11.00	.00	17.86
			69.	18	7	-1.				
YEAR							38.59	131.80	.00	213.89

BLDG 655 - ADMINISTRATION / SUPPLY BASELINE

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	669	0	0	0	-.4669E+06	.0000
FEB	549	0	0	0	-.3829E+06	.0000
MAR	512	0	0	0	-.3897E+06	.0000
APR	328	0	0	0	-.2371E+06	.0000
MAY	194	0	0	0	-.1622E+06	.0000
JUN	62	0	0	0	-.7106E+05	.0000
JUL	28	0	0	0	-.5987E+05	.0000
AUG	34	0	0	0	-.8431E+05	.0000
SEP	151	0	0	0	-.1544E+06	.0000
OCT	349	0	0	0	-.2186E+06	.0000
NOV	492	0	0	0	-.3086E+06	.0000
DEC	659	0	0	0	-.4788E+06	.0000
YEAR	4027	0	0	0	-.4788E+06	.0000

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
MONTH	HEATING MILLION BTU	COOLING THOUSAND KWH	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FANS THOUSAND KWH	HEAT GAIN MILLION BTU	ELECTRIC DEMAND KW
JAN	181.50	.00	3.32	11.33	.00	18.39	11.3
FEB	144.39	.00	2.96	10.11	.00	16.40	11.3
MAR	121.44	.00	3.27	11.17	.00	18.12	11.3
APR	62.35	.00	3.15	10.76	.00	17.46	11.3
MAY	27.57	.00	3.32	11.33	.00	18.39	11.3
JUN	7.50	.00	3.15	10.76	.00	17.46	11.3
JUL	3.31	.00	3.27	11.17	.00	18.12	11.3
AUG	4.20	.00	3.32	11.33	.00	18.39	11.3
SEP	24.20	.00	3.10	10.60	.00	17.20	11.3
OCT	61.24	.00	3.32	11.33	.00	18.39	11.3
NOV	103.21	.00	3.20	10.92	.00	17.72	11.3
DEC	177.14	.00	3.22	11.00	.00	17.86	11.3
YEAR	918.05	.00	38.59	131.80	.00	213.89	11.3

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 99615. BTU/(SQFT-YEAR)

BLDG 655 - ADMINISTRATION / SUPPLY BASELINE

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	-	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.4669E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.3829E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.0000	-.3897E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.0000	-.2371E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.0000	-.1622E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	-.7106E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	-.5987E+05
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	-.8431E+05
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	-.1544E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.0000	-.2186E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.0000	-.3086E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.4788E+06

BLDG 655 - ADMIN / SUPPLY - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 0
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 6.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 1.000000
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 146321.000000
FLOOR AREA (SQFT) 11861.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 493300.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 118610.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 896.000000
INFILTRATION PROFILE

1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

A FACTOR IN INFILTRATION EQUATION (CINA) 3.670000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 22638.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 442.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 157.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	2197.0	476.0	2252.0	729.0
WINDOW AREA SQFT (AWND)	976.0	.0	310.0	.0
WINDOW HEIGHT FT (WNDH)	10.0	.0	10.0	.0
WINDOW WIDTH FT (WNDW)	97.6	.0	31.0	.0
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.064	.064	.064	.064
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00176	.00176	.00176	.00176
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00016	.00016	.00016	.00016
N=3	.00086	.00086	.00086	.00086
N=4	.00066	.00066	.00066	.00066
N=5	.00008	.00008	.00008	.00008
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	-.16643	-.16643	-.16643	-.16643
N=5	.00728	.00728	.00728	.00728
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 11869.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 4.300000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 2.287010E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .211E-05 .316E-04 .104E-03 .780E-04 .148E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.000000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	18737.	9800.	6200.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	.0
2	.100	.000	.000	.000	70.0	.0
3	.100	.000	.000	.000	70.0	.0
4	.100	.000	.000	.000	70.0	.0
5	.100	.000	.000	.000	70.0	.0
6	.100	.000	.000	.000	70.0	.0
7	.100	.100	.200	.200	70.0	.0
8	1.000	.800	1.000	1.000	70.0	.0

```
  9        1.000      .900      1.000      1.000        70.0         .0
 10        1.000      .900      1.000      1.000        70.0         .0
 11         .800      .800       .800       .800        70.0         .0
 12         .500      .700       .400       .400        70.0         .0
 13         .800      .800       .800       .800        70.0         .0
 14        1.000      .900      1.000      1.000        70.0         .0
 15        1.000      .900      1.000      1.000        70.0         .0
 16        1.000      .900      1.000      1.000        70.0         .0
 17        1.000      .800      1.000      1.000        70.0         .0
 18         .200      .200       .100       .100        70.0         .0
 19         .100      .000       .000       .000        70.0         .0
 20         .100      .000       .000       .000        70.0         .0
 21         .100      .000       .000       .000        70.0         .0
 22         .100      .000       .000       .000        70.0         .0
 23         .100      .000       .000       .000        70.0         .0
 24         .100      .000       .000       .000        70.0         .0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)      100.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)    0.000000E+00
ECONOMIZER HIGH TEMP LIMIT F       100.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     0.000000E+00
FAN EFFICIENCY (EFAN)     1.000000E-05
FAN TOTAL PRESSURE IN. WATER  (DP)     0.000000E+00
HEATING PLANT RATED OUTPUT BTU (HFLOT)  493300.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   616625.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100       .191       .200       .286       .300       .369       .400       .451
 .500       .537       .600       .625       .700       .718       .800       .812
 .900       .906      1.00       1.00
CHILLER TYPE (ITYPCH)            4
COOLING PLANT RATED OUTPUT BTU (CFLOT)     1.000000E-10
COOLING PLANT RATED INPUT BTU (CFLIN)     0.000000E+00
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000       .000       .000       .000       .000       .000       .000       .000
 .000       .000       .000       .000       .000       .000       .000       .000
 .000       .000       .000       .000
```

BLDG 655 - ADMIN / SUPPLY - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	22.	0.	0.	0.	0.	0.	0.	0.
	-105.	LOSS		-3.	-16.	0.	-8.	-18.	-101.	0.
FEB	.00	GAIN	24.45	.00	.00	.00	.00	.00	.00	.00
	-84.19	LOSS		-2.26	-13.84	.00	-5.97	-15.69	-87.28	.00
MAR	.00	GAIN	30.26	.00	.00	.00	.00	.00	.00	.00
	-68.60	LOSS		-2.10	-13.46	.00	-4.86	-15.24	-81.33	.00
APR	.00	GAIN	28.94	.00	.00	.00	.01	.00	.00	.00
	-31.52	LOSS		-1.39	-9.44	.00	-2.61	-10.76	-53.54	.00
MAY	.00	GAIN	30.73	.00	.00	.00	.03	.01	.02	.00
	-9.44	LOSS		-1.07	-8.12	.00	-1.49	-8.90	-38.91	.00
JUN	.00	GAIN	31.57	.00	.00	.00	.07	.00	.01	.00
	-1.12	LOSS		-.85	-7.01	.00	-.83	-7.74	-33.69	.00
JUL	.00	GAIN	31.90	.00	.02	.00	.07	.02	.09	.00
	-.36	LOSS		-.83	-7.00	.00	-.81	-7.80	-34.06	.00
AUG	.00	GAIN	27.60	.00	.00	.00	.03	.00	.01	.00
	-.84	LOSS		-.85	-6.76	.00	-.99	-7.40	-31.11	.00
SEP	.00	GAIN	25.90	.00	.02	.00	.04	.02	.07	.00
	-9.93	LOSS		-1.05	-7.03	.00	-1.55	-7.89	-35.92	.00
OCT	.00	GAIN	24.09	.00	.00	.00	.00	.00	.01	.00
	-27.53	LOSS		-1.51	-9.07	.00	-3.12	-10.04	-46.28	.00
NOV	.00	GAIN	20.95	.00	.00	.00	.00	.00	.00	.00
	-52.67	LOSS		-1.90	-11.14	.00	-4.76	-12.35	-61.20	.00
DEC	0.	GAIN	20.	0.	0.	0.	0.	0.	0.	0.
	-102.	LOSS		-3.	-16.	0.	-8.	-18.	-96.	0.
TOT	0.	GAIN	318.	0.	0.	0.	0.	0.	0.	0.
	-494.	LOSS		-19.	-125.	0.	-42.	-140.	-700.	0.

MAX HEATING LOAD= -418405. BTUH ON DEC 18 HOUR 2 AMBIENT TEMP 3.
MAX COOLING LOAD= 0. BTUH ON DEC 31 HOUR 24 AMBIENT TEMP 42.

ZONE UA BTU/HR-F 1826.5

BEACON Energy Analysis By EMC Engineers, Inc. 655FG.I

BLDG 655 - ADMIN / SUPPLY - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	71.	87.		5	16	61.	3.32	11.33	.00	18.39
			69.	27	6	4.				
FEB	71.	89.		13	16	68.	2.96	10.11	.00	16.40
			69.	2	3	15.				
MAR	73.	104.		28	16	76.	3.27	11.17	.00	18.12
			69.	3	5	16.				
APR	78.	107.		30	15	84.	3.15	10.76	.00	17.46
			70.	14	5	30.				
MAY	84.	113.		29	16	85.	3.32	11.33	.00	18.39
			70.	11	4	38.				
JUN	89.	117.		29	16	87.	3.15	10.76	.00	17.46
			70.	17	5	56.				
JUL	93.	124.		31	16	95.	3.27	11.17	.00	18.12
			70.	10	5	57.				
AUG	91.	119.		29	16	95.	3.32	11.33	.00	18.39
			70.	25	5	52.				
SEP	85.	116.		7	16	86.	3.10	10.60	.00	17.20
			70.	15	6	39.				
OCT	77.	111.		4	16	81.	3.32	11.33	.00	18.39
			70.	28	5	31.				
NOV	73.	100.		8	16	75.	3.20	10.92	.00	17.72
			69.	3	4	17.				
DEC	71.	88.		12	16	59.	3.22	11.00	.00	17.86
			69.	18	4	1.				
YEAR							38.59	131.80	.00	213.89

BLDG 655 - ADMIN / SUPPLY - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	637	0	0	0	-.4120E+06	.0000
FEB	524	0	0	0	-.3363E+06	.0000
MAR	489	0	0	0	-.3443E+06	.0000
APR	313	0	0	0	-.2040E+06	.0000
MAY	168	0	0	0	-.1384E+06	.0000
JUN	37	0	0	0	-.5798E+05	.0000
JUL	19	0	0	0	-.4744E+05	.0000
AUG	24	0	0	0	-.7051E+05	.0000
SEP	135	0	0	0	-.1310E+06	.0000
OCT	314	0	0	0	-.1910E+06	.0000
NOV	446	0	0	0	-.2632E+06	.0000
DEC	633	0	0	0	-.4184E+06	.0000
YEAR	3739	0	0	0	-.4184E+06	.0000

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
MONTH	HEATING MILLION BTU	COOLING THOUSAND KWH	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FANS THOUSAND KWH	HEAT GAIN MILLION BTU	ELECTRIC DEMAND KW
JAN	157.44	.00	3.32	11.33	.00	18.39	11.3
FEB	126.68	.00	2.96	10.11	.00	16.40	11.3
MAR	107.68	.00	3.27	11.17	.00	18.12	11.3
APR	56.33	.00	3.15	10.76	.00	17.46	11.3
MAY	23.00	.00	3.32	11.33	.00	18.39	11.3
JUN	4.38	.00	3.15	10.76	.00	17.46	11.3
JUL	2.23	.00	3.27	11.17	.00	18.12	11.3
AUG	2.90	.00	3.32	11.33	.00	18.39	11.3
SEP	20.53	.00	3.10	10.60	.00	17.20	11.3
OCT	52.45	.00	3.32	11.33	.00	18.39	11.3
NOV	88.14	.00	3.20	10.92	.00	17.72	11.3
DEC	153.90	.00	3.22	11.00	.00	17.86	11.3
YEAR	795.66	.00	38.59	131.80	.00	213.89	11.3

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 89297. BTU/(SQFT-YEAR)

BLDG 655 - ADMIN / SUPPLY - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	-	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.4120E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.3363E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.0000	-.3443E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.0000	-.2040E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.0000	-.1384E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	-.5798E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	-.4744E+05
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	-.7051E+05
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	-.1310E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.0000	-.1910E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.0000	-.2632E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.4184E+06

BLDG 655 - ADMIN / SUPPLY ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 0
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 6.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 1.000000
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 146321.000000
FLOOR AREA (SQFT) 11861.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 493300.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 118610.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 896.000000
INFILTRATION PROFILE

1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

A FACTOR IN INFILTRATION EQUATION (CINA) 3.670000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 22638.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 442.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 157.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	2197.0	476.0	2252.0	729.0
WINDOW AREA SQFT (AWND)	976.0	.0	310.0	.0
WINDOW HEIGHT FT (WNDH)	10.0	.0	10.0	.0
WINDOW WIDTH FT (WNDW)	97.6	.0	31.0	.0
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.055	.055	.055	.055
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00174	.00174	.00174	.00174
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00019	.00019	.00019	.00019
N=3	.00089	.00089	.00089	.00089
N=4	.00059	.00059	.00059	.00059
N=5	.00007	.00007	.00007	.00007
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	-.14508	-.14508	-.14508	-.14508
N=5	.00613	.00613	.00613	.00613
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 11869.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 4.300000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 2.287010E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .211E-05 .316E-04 .104E-03 .780E-04 .148E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.000000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	18737.	9800.	6200.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	.0
2	.100	.000	.000	.000	70.0	.0
3	.100	.000	.000	.000	70.0	.0
4	.100	.000	.000	.000	70.0	.0
5	.100	.000	.000	.000	70.0	.0
6	.100	.000	.000	.000	70.0	.0
7	.100	.100	.200	.200	70.0	.0
8	1.000	.800	1.000	1.000	70.0	.0

```
  9        1.000      .900     1.000     1.000        70.0         .0
 10        1.000      .900     1.000     1.000        70.0         .0
 11         .800      .800      .800      .800        70.0         .0
 12         .500      .700      .400      .400        70.0         .0
 13         .800      .800      .800      .800        70.0         .0
 14        1.000      .900     1.000     1.000        70.0         .0
 15        1.000      .900     1.000     1.000        70.0         .0
 16        1.000      .900     1.000     1.000        70.0         .0
 17        1.000      .800     1.000     1.000        70.0         .0
 18         .200      .200      .100      .100        70.0         .0
 19         .100      .000      .000      .000        70.0         .0
 20         .100      .000      .000      .000        70.0         .0
 21         .100      .000      .000      .000        70.0         .0
 22         .100      .000      .000      .000        70.0         .0
 23         .100      .000      .000      .000        70.0         .0
 24         .100      .000      .000      .000        70.0         .0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)      100.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)    0.000000E+00
ECONOMIZER HIGH TEMP LIMIT F       100.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     0.000000E+00
FAN EFFICIENCY (EFAN)     1.000000E-05
FAN TOTAL PRESSURE IN. WATER  (DP)     0.000000E+00
HEATING PLANT RATED OUTPUT BTU (HFLOT)  493300.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   616625.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)            4
COOLING PLANT RATED OUTPUT BTU (CFLOT)     1.000000E-10
COOLING PLANT RATED INPUT BTU (CFLIN)     0.000000E+00
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 655 - ADMIN / SUPPLY ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	22.	0.	0.	0.	0.	0.	0.	0.
	-104.	LOSS		-3.	-16.	0.	-7.	-18.	-101.	0.
FEB	.00	GAIN	24.45	.00	.00	.00	.00	.00	.00	.00
	-83.47	LOSS		-2.26	-13.86	.00	-5.13	-15.71	-87.37	.00
MAR	.00	GAIN	30.26	.00	.00	.00	.00	.00	.00	.00
	-68.08	LOSS		-2.10	-13.48	.00	-4.19	-15.26	-81.44	.00
APR	.00	GAIN	28.94	.00	.00	.00	.01	.00	.00	.00
	-31.31	LOSS		-1.40	-9.46	.00	-2.25	-10.78	-53.66	.00
MAY	.00	GAIN	30.73	.00	.00	.00	.04	.01	.02	.00
	-9.37	LOSS		-1.08	-8.13	.00	-1.30	-8.92	-39.00	.00
JUN	.00	GAIN	31.57	.00	.00	.00	.08	.00	.01	.00
	-1.10	LOSS		-.86	-7.02	.00	-.74	-7.76	-33.75	.00
JUL	.00	GAIN	31.90	.00	.02	.00	.08	.02	.09	.00
	-.36	LOSS		-.83	-7.01	.00	-.72	-7.81	-34.13	.00
AUG	.00	GAIN	27.60	.00	.00	.00	.04	.00	.01	.00
	-.83	LOSS		-.85	-6.77	.00	-.87	-7.42	-31.19	.00
SEP	.00	GAIN	25.90	.00	.02	.00	.04	.02	.07	.00
	-9.86	LOSS		-1.05	-7.05	.00	-1.35	-7.91	-36.01	.00
OCT	.00	GAIN	24.09	.00	.00	.00	.00	.00	.01	.00
	-27.29	LOSS		-1.52	-9.09	.00	-2.70	-10.07	-46.41	.00
NOV	.00	GAIN	20.95	.00	.00	.00	.00	.00	.00	.00
	-52.16	LOSS		-1.90	-11.16	.00	-4.10	-12.37	-61.30	.00
DEC	0.	GAIN	20.	0.	0.	0.	0.	0.	0.	0.
	-101.	LOSS		-3.	-16.	0.	-7.	-18.	-96.	0.
TOT	0.	GAIN	318.	0.	0.	0.	0.	0.	0.	0.
	-490.	LOSS		-19.	-125.	0.	-37.	-140.	-702.	0.

MAX HEATING LOAD= -416418. BTUH ON DEC 18 HOUR 2 AMBIENT TEMP 3.
MAX COOLING LOAD= 0. BTUH ON DEC 31 HOUR 24 AMBIENT TEMP 42.

ZONE UA BTU/HR-F 1775.7

BLDG 655 - ADMIN / SUPPLY ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL INTERNAL HEAT GAIN MILLION BTU
JAN	71.	87.		5	16	61.	3.32	11.33	.00	18.39
			69.	27	6	4.				
FEB	72.	89.		13	16	68.	2.96	10.11	.00	16.40
			69.	2	3	15.				
MAR	73.	104.		28	16	76.	3.27	11.17	.00	18.12
			69.	3	5	16.				
APR	78.	107.		30	15	84.	3.15	10.76	.00	17.46
			70.	14	5	30.				
MAY	84.	113.		29	16	85.	3.32	11.33	.00	18.39
			70.	11	4	38.				
JUN	89.	117.		29	16	87.	3.15	10.76	.00	17.46
			70.	17	5	56.				
JUL	93.	124.		31	16	95.	3.27	11.17	.00	18.12
			70.	10	5	57.				
AUG	91.	119.		29	16	95.	3.32	11.33	.00	18.39
			70.	25	5	52.				
SEP	85.	116.		7	16	86.	3.10	10.60	.00	17.20
			70.	15	6	39.				
OCT	77.	111.		4	16	81.	3.32	11.33	.00	18.39
			70.	28	5	31.				
NOV	73.	100.		8	16	75.	3.20	10.92	.00	17.72
			69.	3	4	17.				
DEC	71.	88.		12	16	59.	3.22	11.00	.00	17.86
			69.	18	4	1.				
YEAR							38.59	131.80	.00	213.89

BLDG 655 - ADMIN / SUPPLY ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	636	0	0	0	-.4104E+06	.0000
FEB	523	0	0	0	-.3347E+06	.0000
MAR	488	0	0	0	-.3429E+06	.0000
APR	313	0	0	0	-.2034E+06	.0000
MAY	167	0	0	0	-.1379E+06	.0000
JUN	37	0	0	0	-.5783E+05	.0000
JUL	19	0	0	0	-.4728E+05	.0000
AUG	24	0	0	0	-.7030E+05	.0000
SEP	135	0	0	0	-.1305E+06	.0000
OCT	311	0	0	0	-.1902E+06	.0000
NOV	440	0	0	0	-.2616E+06	.0000
DEC	632	0	0	0	-.4164E+06	.0000
YEAR	3725	0	0	0	-.4164E+06	.0000

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	156.38	.00	3.32	11.33	.00	18.39	11.3
FEB	125.89	.00	2.96	10.11	.00	16.40	11.3
MAR	107.10	.00	3.27	11.17	.00	18.12	11.3
APR	56.16	.00	3.15	10.76	.00	17.46	11.3
MAY	22.84	.00	3.32	11.33	.00	18.39	11.3
JUN	4.38	.00	3.15	10.76	.00	17.46	11.3
JUL	2.23	.00	3.27	11.17	.00	18.12	11.3
AUG	2.90	.00	3.32	11.33	.00	18.39	11.3
SEP	20.48	.00	3.10	10.60	.00	17.20	11.3
OCT	51.92	.00	3.32	11.33	.00	18.39	11.3
NOV	87.03	.00	3.20	10.92	.00	17.72	11.3
DEC	152.85	.00	3.22	11.00	.00	17.86	11.3
YEAR	790.16	.00	38.59	131.80	.00	213.89	11.3

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 88833. BTU/(SQFT-YEAR)

BLDG 655 - ADMIN / SUPPLY ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.4104E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.3347E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.0000	-.3429E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.0000	-.2034E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.0000	-.1379E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	-.5783E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	-.4728E+05
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	-.7030E+05
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	-.1305E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.0000	-.1902E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.0000	-.2616E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.4164E+06

BUILDING MANAGER INTERVIEW

BUILDING INFORMATION:							
Building No:	655		Building Name:	Administration/Supply			
Surveyed by:	AJN		Date:	11/7/95	Building Use:	Administration/Supply	
Building Contact:		Capt. Barrett			Phone No:	596-3734	
Building Contact:					Phone No:		
OCCUPANCY:							
Number of Employees:		Mon./Fri.:	40	Schedule:	800	To	1700
		Tues./Thurs.				To	
		Wed.				To	
		Sat./Sun.	0			To	
Visitors Per Day:		Mon./Fri.:	0	Schedule:		To	
		Tues./Thurs	0			To	
		Wed.	0			To	
		Sat./Sun.	0			To	
Comments:							
LIGHTING SCHEDULE:							
Normal Occupancy:		Mon.-Fri.:		Schedule:	800	To	1700
		Sat./Sun.:				To	
Cleaning Crew/2nd Shift:		Mon.-Fri.:		Schedule:		To	
		Sat./Sun.:				To	
EQUIPMENT SCHEDULE:							
Fan/AHU Schedule:		Mon.-Fri.:		Schedule:	0	To	2400
		Sat./Sun.:			0	To	2400
Chiller Schedule:		Mon.-Fri.:		Schedule:		To	
		Sat./Sun.:				To	
Boiler Schedule:		Mon.-Fri.:		Schedule:	0	To	2400
		Sat./Sun.:			0	To	2400
Aux. Equipment Schedule:							
Domestic HW		Mon.-Fri.:		Schedule:	0	To	2400
		Sat./Sun.:			0	To	2400
		Mon.-Fri.:		Schedule:		To	
		Sat./Sun.:				To	
Comments:							

Building No 655 **Building Name:** Administration/Supply

BUILDING ENVELOPE

EXTERIOR WALLS

Wall Direction (N, E, W, or S)	Wall Construction No.	Comments
N	XW-1	
E	XW-1	
S	XW-1	
W	XW-1	

LIST OF EXT. WALL CONSTRUCTION TYPES

Wall Construction No.	Description
XW-1	Face Brick & CMU
XW-2	Face Brick, CMU, & Gyp. Board
XW-3	Face Brick, CMU, & Ceramic Tile
XW-4	Face Brick, CMU, & Plaster Coat
XW-5	Insulated Metal Panel

WINDOWS

Window Direction (N, E, W, or S)	Window Construction No.	Comments
N	W-1	
E	W-1	
S	W-1	
W	W-1	

LIST OF WINDOW TYPES

Window Construction No.	Description
W-1	Double Pane Clear
W-2	Double Pane Tinted
W-3	Single Pane with Storm Windows
W-4	Single Pane

ROOF CONSTRUCTION

Roof Location	Roof Construction No.	Comments
Admin. Area		
ALL	R-1	
Supply Area		
ALL	R-2	

LIST OF ROOF CONSTRUCTION TYPES

Roof Construction No.	Description
R-1	BUR, Rigid Insul., Metal Deck, Air Space, Hard Board Ceiling, Air space, Ceiling Tile
R-2	BUR, Rigid Insul., Metal Deck, 6" Batt Insul.
R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Clg
R-4	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plaster Clg.
R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceiling Tile
R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaster Clg.

Building No 655 **Building Name:** Administration/Supply

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

INTERIOR EQUIPMENT AND OBJECTS			
Wall Direction (N, E, W, or S)	Item No.	No. of Items	Comments
N	A-2	10	
N	A-4	15	
N	M-3	15	15 @ 10' ea.
N	E-2	6	
E	E-2	3	
S	M-3	10	10 @ 12' ea.
S	E-2	6	
S	E-3	3	
S	F-4	5	
			Exterior walls in Administration Area are covered with wooden paneling 3'-0" A.F.F.
			12'x12'x8' caged area with wood ceiling located in supply area.

LIST OF EQUIPMENT AND OBJECTS	
Item No.	Description
	Architectural
A-1	Interior Partitions
A-2	Wall Placards
A-3	Drapery Valances
A-4	Drapery Rods, Venician Blinds
A-5	Bleachers
A-6	Lockers
A-7	Mirror
	Plumbing
P-1	Sinks
P-2	Commodes
P-3	Toilet Stalls
P-4	Water Fountains
	HVAC Mechanical
M-1	Floor Supply/Return Grilles
M-2	Ceiling Supply/Return Grilles
M-3	Finned-Tube Baseboard Radiators
M-4	Thermostats / Space Temp. Sensors
M-5	Wall mounted convection type heater
	Electrical
E-1	Electrical Panels
E-2	Electrical Outlets
E-3	Electrical Light Switches
E-4	Electrican Conduit
E-5	Emergency light
E-6	Electrical Disconnect
	Lighting
L-1	Wall Mounted Fixtures
L-2	Ceiling Mounted Fixtures
L-3	Exit Signs
	Fire Protection
F-1	Alarm Pull Switches
F-2	Alarm Sound Devices (Speakers, Bells)
F-3	Sprinkler Heads
F-4	Fire Extinguishes
	Communication
C-1	Telephones - Wall Mounted
C-2	Telephones - Booth Mounted
C-3	Telephone Jacks

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
BLDG: **655**
FILE: **655RD1**

PERIMETER RADIATION SURVEY OBSERVATIONS

RD-1	PER RAD NO.	**MECH. RM.**	LOCATION (RM)
CV-1	SOURCE OF HEATING	**ALL**	SERVES AREA

UNIT TYPE:

	STEAM	X	HW		ELECTRIC				
	OTHER								
	COMMENT:								

NAMEPLATE:

	HW PUMP 1 - HP		MFG.		MODEL
	HW PUMP 2 - HP		MFG.		MODEL
	HW PUMP 3 - HP		MFG.		MODEL
	HW PUMP 4 - HP		MFG.		MODEL
COMMENT:				100.0%	% AREA HEATING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	0	0	0	0	0	1	1	1

CONTROLS:

		PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
RADIATION CONTROL:	X	NONE		2-WAY VLV		3-WAY VLV		OTHER	
SPACE SETPOINT (oF):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
RESET CONTROL (oF):		HW HIGH		HW LOW		OA LOW		OA HIGH	
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
BLDG: **655**
FILE: **655CV1**

BOILER & CONVERTER SURVEY OBSERVATIONS

CV-1	BOILER/CONVERTER NO.	**MECH. RM.**	LOCATION (RM)
C.P.	SOURCE OF HEATING (PLANT)	**ALL**	SERVES AREA

UNIT TYPE:

	STEAM		PSIG		HW		TEMP.		BOILER TYPE:
	NO.2 OIL		NO.6 OIL		N.GAS		ELEC		FUELS:
X	STM/HW		HTHW/HW		HTHW/STM		OTHER		CONVERTER TYPE:
	SPACE HEAT		DHW		OTHER				USE:
COMMENT:									% HTG AREA SERVED
									BB RADIATION ONLY

NAMEPLATE:

DUNHAM-BUSH	MFG.	**FC-62-2**	MODEL	**520000**	CAPACITY OUTPUT (BTUH)
				547368	CAPACITY INPUT (BTUH)
	MFG.		MODEL		CAPACITY OUTPUT (BTUH)
					CAPACITY INPUT (BTUH)

0.75	HW PUMP 1 - HP	**GENERAL ELECTRIC**	MFG.	**5K38ND567**	MODEL
	HW PUMP 2 - HP		MFG.		MODEL
	HW PUMP 3 - HP		MFG.		MODEL

COMMENT:

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	**0**	**0**	**0**	**0**	**0**	**0**	**0**	TIMECLOCK?
PRESENT STOP TIME	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**

CONTROLS:

		PNEUMATIC	**X**	ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		PSIG		HW SUPPLY					
RESET CONTROL (oF):	**180**	HW HIGH	**90**	HW LOW	**65**	OA LOW	**0**	OA HIGH	
BURNER CONTROLS		O2 TRIM (Y/N)		OTHER					
COMMENTS:	**TIMECLOCK HAS NO PINS**								

ANNUAL ENERGY SAVINGS SUMMARY
FOR BARRACKS WITH A/C - BUILDINGS 627, 628, 629, 634, 635, 651, 652, 654, 659, 660, 1012, 1013, 1014, 1015, 1016, 1028, & 1029

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Baseline Annual Electric (MBtu)	ECO 1 - Annual Electric (MBtu)	Annual Electric Energy Savings (MBtu)	Baseline Peak Electric Demand (kW)	ECO 1 - Peak Electric Demand (kW)	Peak Electric Demand Savings (kW)	Baseline Nat. Gas Energy Savings (MBtu)	ECO 1 - Annual Nat. Gas (MBtu)	Annual Nat. Gas Energy Savings (MBtu)
651	178.84	160.62	18.23	77.10	72.60	4.50	3754.18	3418.90	335.28

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 651 (SF)	Square Foot Adjust-ment Factor	Annual Electric Energy Savings (MBtu)	Adjusted Annual Electric Energy Savings* (MBtu)	Peak Electric Demand Savings (kW)	Adjusted Peak Electric Demand Savings* (kW)	Annual Nat. Gas Energy Savings (MBtu)	Adjusted Annual Nat. Gas Energy Savings* (MBtu)
627	40,640	40,990	0.991	18.23	18.07	4.50	4.46	335.28	332.42
628	40,640	40,990	0.991	18.23	18.07	4.50	4.46	335.28	332.42
629	40,640	40,990	0.991	18.23	18.07	4.50	4.46	335.28	332.42
634	40,990	40,990	1.000	18.23	18.23	4.50	4.50	335.28	335.28
635	40,990	40,990	1.000	18.23	18.23	4.50	4.50	335.28	335.28
651	40,990	40,990	1.000	18.23	18.23	4.50	4.50	335.28	335.28
652	40,990	40,990	1.000	18.23	18.23	4.50	4.50	335.28	335.28
654	40,990	40,990	1.000	18.23	18.23	4.50	4.50	335.28	335.28
659	40,990	40,990	1.000	18.23	18.23	4.50	4.50	335.28	335.28
660	40,990	40,990	1.000	18.23	18.23	4.50	4.50	335.28	335.28
1012	40,640	40,990	0.991	18.23	18.07	4.50	4.46	335.28	332.42
1013	40,640	40,990	0.991	18.23	18.07	4.50	4.46	335.28	332.42
1014	40,640	40,990	0.991	18.23	18.07	4.50	4.46	335.28	332.42
1015	40,640	40,990	0.991	18.23	18.07	4.50	4.46	335.28	332.42
1016	40,640	40,990	0.991	18.23	18.07	4.50	4.46	335.28	332.42
1028	40,640	40,990	0.991	18.23	18.07	4.50	4.46	335.28	332.42
1029	40,640	40,990	0.991	18.23	18.07	4.50	4.46	335.28	332.42

*Energy savings prorated on a square foot basis

ANNUAL ENERGY SAVINGS SUMMARY
FOR BARRACKS WITH A/C - BUILDINGS 627, 628, 629, 634, 635, 651, 652, 654, 659, 660, 1012, 1013, 1014, 1015, 1016, 1028, & 1029

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Baseline Annual Electric (MBtu)	ECO 2 - Annual Electric (MBtu)	Annual Electric Energy Savings (MBtu)	Baseline Peak Electric Demand (kW)	ECO 2 - Peak Electric Demand (kW)	Peak Electric Demand Savings (kW)	Baseline Annual Nat. Gas (MBtu)	ECO 2 - Annual Nat. Gas (MBtu)	Annual Nat. Gas Energy Savings (MBtu)
651	178.84	159.52	19.32	77.10	72.40	4.70	3754.18	3399.52	354.66

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 651 (SF)	Square Foot Adjust-ment Factor	Annual Electric Energy Savings (kWh)	Adjusted Annual Electric Energy Savings* (kWh)	Peak Electric Demand Savings (kW)	Adjusted Peak Electric Demand Savings* (kW)	Annual Nat. Gas Energy Savings (MBtu)	Adjusted Annual Nat. Gas Energy Savings* (MBtu)
627	40,640	40,990	0.991	19.32	19.15	4.70	4.66	354.66	351.63
628	40,640	40,990	0.991	19.32	19.15	4.70	4.66	354.66	351.63
629	40,640	40,990	0.991	19.32	19.15	4.70	4.66	354.66	351.63
634	40,990	40,990	1.000	19.32	19.32	4.70	4.70	354.66	354.66
635	40,990	40,990	1.000	19.32	19.32	4.70	4.70	354.66	354.66
651	40,990	40,990	1.000	19.32	19.32	4.70	4.70	354.66	354.66
652	40,990	40,990	1.000	19.32	19.32	4.70	4.70	354.66	354.66
654	40,990	40,990	1.000	19.32	19.32	4.70	4.70	354.66	354.66
659	40,990	40,990	1.000	19.32	19.32	4.70	4.70	354.66	354.66
660	40,990	40,990	1.000	19.32	19.32	4.70	4.70	354.66	354.66
1012	40,640	40,990	0.991	19.32	19.15	4.70	4.66	354.66	351.63
1013	40,640	40,990	0.991	19.32	19.15	4.70	4.66	354.66	351.63
1014	40,640	40,990	0.991	19.32	19.15	4.70	4.66	354.66	351.63
1015	40,640	40,990	0.991	19.32	19.15	4.70	4.66	354.66	351.63
1016	40,640	40,990	0.991	19.32	19.15	4.70	4.66	354.66	351.63
1028	40,640	40,990	0.991	19.32	19.15	4.70	4.66	354.66	351.63
1029	40,640	40,990	0.991	19.32	19.15	4.70	4.66	354.66	351.63

*Energy savings prorated on a square foot basis

INVESTMENT COST SUMMARY
FOR BARRACKS WITH A/C - BUILDINGS 627, 628, 629, 634, 635, 651, 652 654, 659, 660, 1012, 1013, 1014, 1015, 1016, 1028, & 1029

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Investment Cost ($)
651	$176,620

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 651 (SF)	Square Foot Adjust-ment Factor	Investment Cost ($)	Adjusted Investment Cost ($)*
627	40,640	40,990	0.991	$176,620	$175,112
628	40,640	40,990	0.991	$176,620	$175,112
629	40,640	40,990	0.991	$176,620	$175,112
634	40,990	40,990	1.000	$176,620	$176,620
635	40,990	40,990	1.000	$176,620	$176,620
651	40,990	40,990	1.000	$176,620	$176,620
652	40,990	40,990	1.000	$176,620	$176,620
654	40,990	40,990	1.000	$176,620	$176,620
659	40,990	40,990	1.000	$176,620	$176,620
660	40,990	40,990	1.000	$176,620	$176,620
1012	40,640	40,990	0.991	$176,620	$175,112
1013	40,640	40,990	0.991	$176,620	$175,112
1014	40,640	40,990	0.991	$176,620	$175,112
1015	40,640	40,990	0.991	$176,620	$175,112
1016	40,640	40,990	0.991	$176,620	$175,112
1028	40,640	40,990	0.991	$176,620	$175,112
1029	40,640	40,990	0.991	$176,620	$175,112

*Investment Cost prorated on a square foot basis

INVESTMENT COST SUMMARY
FOR BARRACKS WITH A/C - BUILDINGS 627, 628, 629, 634, 635, 651, 652 654, 659, 660, 1012, 1013, 1014, 1015, 1016, 1028, & 1029

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Investment Cost ($)
651	$181,928

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 651 (SF)	Square Foot Adjust-ment Factor	Investment Cost ($)	Adjusted Investment Cost ($)*
627	40,640	40,990	0.991	$181,928	$180,374
628	40,640	40,990	0.991	$181,928	$180,374
629	40,640	40,990	0.991	$181,928	$180,374
634	40,990	40,990	1.000	$181,928	$181,928
635	40,990	40,990	1.000	$181,928	$181,928
651	40,990	40,990	1.000	$181,928	$181,928
652	40,990	40,990	1.000	$181,928	$181,928
654	40,990	40,990	1.000	$181,928	$181,928
659	40,990	40,990	1.000	$181,928	$181,928
660	40,990	40,990	1.000	$181,928	$181,928
1012	40,640	40,990	0.991	$181,928	$180,374
1013	40,640	40,990	0.991	$181,928	$180,374
1014	40,640	40,990	0.991	$181,928	$180,374
1015	40,640	40,990	0.991	$181,928	$180,374
1016	40,640	40,990	0.991	$181,928	$180,374
1028	40,640	40,990	0.991	$181,928	$180,374
1029	40,640	40,990	0.991	$181,928	$180,374

*Investment Cost prorated on a square foot basis

LIFE CYCLE COST ANALYSIS SUMMARY

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Leonard Wood	REGION: 2 (Missouri)		PROJECT NO:	1406-011
PROJECT TITLE:	Limited Energy Study, Insulate Brick Buildings			FISCAL YEAR:	1996
ANALYSIS DATE:	02/18/96	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz

1. INVESTMENT: **BLDG 651 - INSTALL 3.5" BATT INSULATION ON WALLS**

A.	CONSTRUCTION COST	=	$156,301	
B.	SIOH COST	(7.0% of 1A) =	$10,941	
C.	DESIGN COST	(6.0% of 1A) =	$9,378	
D.	TOTAL COST	(1A +1B +1C) =	$176,620	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT	=	$0	
F.	PUBLIC UTILITY COMPANY REBATE	=	$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$176,620

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96

	ENERGY SOURCE	FUEL COS $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$7.33	18.23	$134	13.80	$1,843	
B.	DIST	$0.00	0	$0	0.00	$0	
C.	NAT GAS	$5.30	335.28	$1,777	17.76	$31,559	
D.	COAL	$0.00	0	$0	0.00	$0	
E.	ELEC. DEMAND			$334	13.47	$4,499	
F.	TOTAL		353.51	$2,245		-------->	$37,901

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1	ANNUAL MAINTENANCE	$0	14.88	$0
2		$0	14.88	$0
3		$0	14.88	$0
4	TOTAL ANNUAL DISC. SAVINGS (+) / COST	$0		$0

B. NON-RECURRING (+/-)

ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)
a. BASELINE EQUIP. REPLCMNT.	$0			$0
b.				$0
c.				$0
d.				$0
e.				$0
f. TOTAL	$0			$0

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = $0

4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3 + 3A4 + (3Bf1/Economic Life)) $2,245

5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = 78.69

6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) = $37,901

7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.21
(MUST HAVE SIR > 1.25 TO QUALIFY)

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	SHEET 1 OF 1	
ENGINEER	E M C Engineers, Inc.	DATE PREPARED	18-Feb-96
	Denver, CO	ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST Quantity	Unit Cost	Total	LABOR COST Crew/ Worker	Hours/ Unit	Total	TOTAL
1		**BUILDING 651**								
2		**INSTALL 3.5" BATT INSULATION ON WALLS**								
3										
4										
5	I3-1/2I	INSTALL 3-1/2" BATT INSULATION	S.F.	20808.0	$0.18	$3,772	1-CARP	0.007	$3,827	$7,598
6	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	19798.0	$0.20	$3,966	2-CARP	0.017	$17,685	$21,651
7	ISW	INSTALL 2"x4" STUDDED WALL 2' OC	L.F.	12007.0	$0.24	$2,829	F-2	0.009	$5,955	$8,785
8	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	20808.0	$0.07	$1,390	1-PORD	0.01	$5,022	$6,412
9	R2SSS	RELOCATE 2' STAINLESS STEEL SHELF	EA.	6.0	$0.00	$0	1-CARP	0.533	$84	$84
10	R6WMH	RELOCATE 6' BASEBOARD RADIATION	EA.	99.0	$18.39	$1,821	Q-6	4.68	$40,526	$42,347
11	RDV	RELOCATE DRYER VENT	EA.	6.0	$11.45	$69	1-CARP	1.3	$205	$274
12	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	15.0	$8.82	$132	1-ELEC	0.844	$385	$518
13	REO	RELOCATE ELECTRICAL OUTLET	EA.	12.0	$7.97	$96	1-ELEC	0.896	$327	$423
14	REP	RELOCATE ELECTRICAL PANEL	EA.	3.0	$0.00	$0	1-ELEC	12.191	$1,113	$1,113
15	IWB-5/8	INSTALL 5/8" WATERPRF BRD - TAPED & SANDE	S.F.	1010.0	$0.96	$965	2-CARP	0.02	$1,061	$2,026
16	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	1010.0	$1.83	$1,850	2-TILE	0.084	$4,109	$5,959
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27		**SUBTOTAL**				$16,889			$80,301	$97,190
28	DIFF	DIFFICULTLY FACTOR			5%				$4,015	$4,015
29		**SUBTOTAL**				$16,889			$84,316	$101,205
30	OH	OVERHEAD			17%	$2,871			$14,334	$17,205
31		**SUBTOTAL**				$19,760			$98,650	$118,410
32	PRO	PROFIT			10%	$1,976			$9,865	$11,841
33		**SUBTOTAL**				$21,736			$108,515	$130,251
34	CONT	CONTINGENCY			20%	$4,347			$21,703	$26,050
35	**TOTAL COST**					$26,083			$130,218	$156,301

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Leonard Wood	REGION: 2 (Missouri)		PROJECT NO:	1406-011
PROJECT TITLE:	Limited Energy Study, Insulate Brick Buildings			FISCAL YEAR:	1996
ANALYSIS DATE:	02/18/96	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz

1. INVESTMENT: **BLDG 651 - INSTALL 1.5" RIGID INSULATION ON WALLS**

A.	CONSTRUCTION COST	=	$160,998	
B.	SIOH COST	(7.0% of 1A) =	$11,270	
C.	DESIGN COST	(6.0% of 1A) =	$9,660	
D.	TOTAL COST	(1A +1B +1C) =	$181,928	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT	=	$0	
F.	PUBLIC UTILITY COMPANY REBATE	=	$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$181,928

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96

	ENERGY SOURCE	FUEL COS $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$7.33	19.32	$142	13.80	$1,953	
B.	DIST	$0.00	0	$0	0.00	$0	
C.	NAT GAS	$5.30	354.66	$1,880	17.76	$33,383	
D.	COAL	$0.00	0	$0	0.00	$0	
E.	ELEC. DEMAND			$349	13.47	$4,699	
F.	TOTAL		373.98	$2,370		------->	$40,035

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1	ANNUAL MAINTENANCE	$0	$0
2		$0	$0
3		$0	$0
4	TOTAL ANNUAL DISC. SAVINGS (+) / COST	$0	$0

B. NON-RECURRING (+/-)

ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)
a. BASELINE EQUIP. REPLCMNT.				$0
b.				$0
c.				$0
d.				$0
e.				$0
f. TOTAL	$0			$0

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = $0

4.	FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-)	(2F3 + 3A4 + (3Bf1/Economic Life))	$2,370
5.	SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY)	(1G/4) =	76.76
6.	TOTAL NET DISCOUNTED SAVINGS	(2F5 + 3C) =	$40,035
7.	DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (MUST HAVE SIR > 1.25 TO QUALIFY)	(6/1G) =	0.22

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	SHEET 1	OF 1
ENGINEER	E M C Engineers, Inc.	DATE PREPARED	18-Feb-96
	Denver, CO	ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST			LABOR COST			TOTAL
				Quantity	Unit Cost	Total	Crew/ Worker	Hours/ Unit	Total	
1		**BUILDING 651**								
2		**INSTALL 1.5" RIGID INSULATION ON WALLS**								
3										
4										
5	I1-1/2RI	INSTALL 1-1/2" RIGID INSULATION	S.F.	20808.0	$0.59	$12,308	1-CARP	0.008	$4,373	$16,681
6	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	19798.0	$0.20	$3,966	2-CARP	0.017	$17,685	$21,651
7	IFS	INSTALL 3/4"x2" FURRING STRIPS	L.F.	4767.0	$0.19	$910	1-CARP	0.016	$2,004	$2,913
8	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	20808.0	$0.07	$1,390	1-PORD	0.01	$5,022	$6,412
9	R2SSS	RELOCATE 2' STAINLESS STEEL SHELF	EA.	6.0	$0.00	$0	1-CARP	0.533	$84	$84
10	R6WMH	RELOCATE 6' BASEBOARD RADIATION	EA.	99.0	$18.39	$1,821	Q-6	4.68	$40,526	$42,347
11	RDV	RELOCATE DRYER VENT	EA.	6.0	$11.45	$69	1-CARP	1.3	$205	$274
12	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	15.0	$8.82	$132	1-ELEC	0.844	$385	$518
13	REO	RELOCATE ELECTRICAL OUTLET	EA.	12.0	$7.97	$96	1-ELEC	0.896	$327	$423
14	REP	RELOCATE ELECTRICAL PANEL	EA.	3.0	$0.00	$0	1-ELEC	12.191	$1,113	$1,113
15	IWB-5/8	INSTALL 5/8" WATERPRF BRD - TAPED & SANDE	S.F.	1010.0	$0.96	$965	2-CARP	0.02	$1,061	$2,026
16	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	1010.0	$1.83	$1,850	2-TILE	0.084	$4,109	$5,959
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27		**SUBTOTAL**				$23,505			$76,896	$100,401
28	DIFF	DIFFICULTLY FACTOR			5%				$3,845	$3,845
29		**SUBTOTAL**				$23,505			$80,741	$104,246
30	OH	OVERHEAD			17%	$3,996			$13,726	$17,722
31		**SUBTOTAL**				$27,501			$94,467	$121,968
32	PRO	PROFIT			10%	$2,750			$9,447	$12,197
33		**SUBTOTAL**				$30,251			$103,914	$134,165
34	CONT	CONTINGENCY			20%	$6,050			$20,783	$26,833
35	**TOTAL COST**					$36,301			$124,697	$160,998

E M C ENGINEERS, INC.

DATE: Feb-96
BY: DMS
JOB: 1406.011
CHK: AJN
FILE: 651BHL

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT LEONARD WOOD, MO.

BUILDING HEATING LOAD CALCULATION SHEET

BLDG NO: 651 BLDG NAME: BARRACKS WITH AC
BLDG FUNCTION:
FLOOR AREA: (SQ. FT) 40,986 # FLOORS 3
SLAB PERIMETER: (FT) 514

I. AREAS: ([ ] FIELD VERIFIED ELEVATION PLANS)

		NORTH	SOUTH	EAST	WEST	TOTAL
WALLS, GROSS	(SQ. FT)	9,088	9,088	1,845	1,845	21,866
GLASS	(SQ. FT)	467	435	17	19	938
PERSONNEL DOOR	(SQ. FT)	80	40	0	0	120
INSULATED PANEL	(SQ. FT)	233	217	9	9	468
WALLS, NET	(SQ. FT)	8,308	8,396	1,819	1,817	20,341
ROOF AREA (OR CEILING AREA IF ATTIC IS UNCONDITIONED)					(SQ. FT)	13,662
INSULATED PANEL	(SQ. FT)	468	PERSONNEL DOOR		(SQ. FT)	120
BASEMENT WALLS	(SQ. FT)	0	0	0	0	0

II. CONSTRUCTION: ([ ] FIELD VERIFIED WALL, ROOF, WINDOW, DOOR TYPES)

WALLS: (SKETCH CROSS SECTION OF WALL)	COMPONENTS	R-VALUE
	1. OUTSIDE AIR FILM	0.17
	2. 4" FACE BRICK	0.43
	3. AIR SPACE	0.91
	4. 4"CMU / 9" L.W. CONC.	3.00
	5.	
	6.	
	7. INSIDE AIR FILM	0.68
	TOTAL R-WALL =	5.19
	U=1/R	0.193

ROOF: (SKETCH CROSS SECTION OF ROOF)	COMPONENTS	R-VALUE
	1. OUTSIDE AIR FILM	0.17
	2. BUILT UP ROOF	0.34
	3. 2" INSULATION	8.00
	4. 7" L.W. CONCRETE	6.25
	5.	
	6.	
	7. INSIDE AIR FILM	0.68
	TOTAL R-ROOF =	15.44
	U=1/R	0.065

GLASS TYPE:	PPG 'PENNVERNON' C.L. TWNDV, SSA, .88 S.C.	R-GLASS	1.61
SLAB TYPE FLOOR:	CEMENT	SLF	0.83
BASEMENT TYPE:	NONE	R-BASEM.	0.00
INSULATED PANEL:		R-PANEL	4.20
PERSONNEL DOOR TYPE:	METAL	R-PDOOR	2.56

III. INFILTRATION:

TIGHT WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.042	=	0
AVG. WALL H/M/L (SQ.FT.)	H	21866	X CFM / SQ.FT.	0.138	=	3,018
LEAKY WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
DOOR OPENINGS / HR - SINGLE DOOR		50	X CFM /OPENING /HR	1.600	=	80
DOOR OPENINGS / HR - DOUBLE DOORS		50	X CFM /OPENING /HR	1.385	=	69
			TOTAL INFILTRATION (CFM)		=	3167

UA PANEL	PANEL AREA	468	X PANEL "U"	0.238	=	111
UA PDOOR	PDOOR AREA	120	X DOOR "U"	0.391	=	47
UA WALL	WALL AREA	19,873	X WALL "U"	0.193	=	3,917
UA ROOF	ROOF AREA	13,662	X ROOF "U"	0.065	=	885
UA GLASS	GLASS AREA	938	X GLASS "U"	0.621	=	582
UA SLAB	SLAB PERIM.	514	X SLF	0.830	=	427
UA BASEM.	B-WALL AREA	0	X BASE. "U"	0.000	=	0
INFILTRATION	CFM	3167	X A. T. F.	1.035	=	3,278
			TOTAL UA (BTU/HR°F)			9,247

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 651ZN1
BLDG: 651 ZONE: 1

Rates of Heat Gain from Occupants of Conditioned Spaces

Zone No.	No. of People	Activity Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)
1	125	4	Seated, light work, typing	Offices, hotels, a	250	200	31,250	25,000
TOT	125					TOTAL	31,250	25,000

Peak Wattage Value for Lights

Zone No.	No. of Fixtures	Fixture Type	Description	Watts/Fixture	Total Wattage
1	18	5	Fluorescent, 1 - 34w lamp, 16w ballast (1x4 ft. fixture)	50	900
	76	6	Fluorescent, 2 - 34w lamps, 16w ballast (2x4 ft. fixture)	84	6,384
	64	8	Fluorescent, 4 - 34w lamps, 2 - 16w ballasts (2x4 ft. fix.)	168	10,752
	102	18	Incandescent - 60w	60	6,120
TOT	260			TOTAL	24,156

Peak Value for Internal Gains

Zone No.	No. of Equipment	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattag	Total (BTU)
1	6	68	Washing Machine (Automatic)	512	20%	3,072	10,485
	6	23	Clothes Dryer	4,856	45%	29,136	99,441
				TOTAL	43%	32,208	109,926

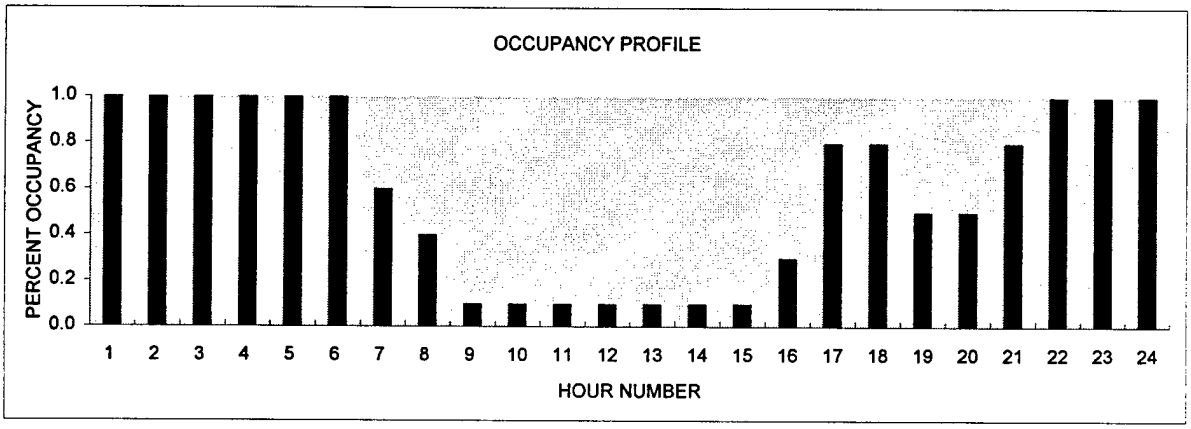
V:\1406.011\COLECTD\FIELD\PLE\651Z1.XLS

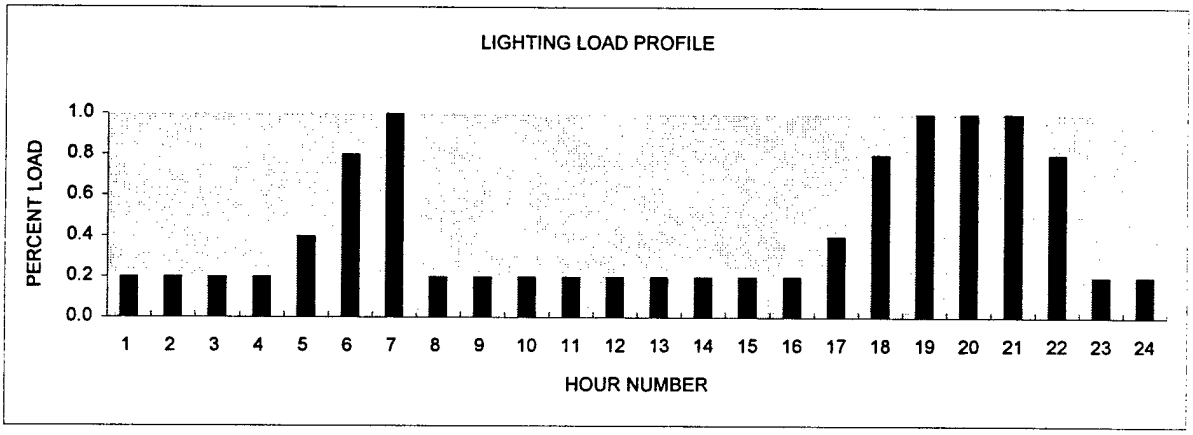
E M C Engineers, Inc.

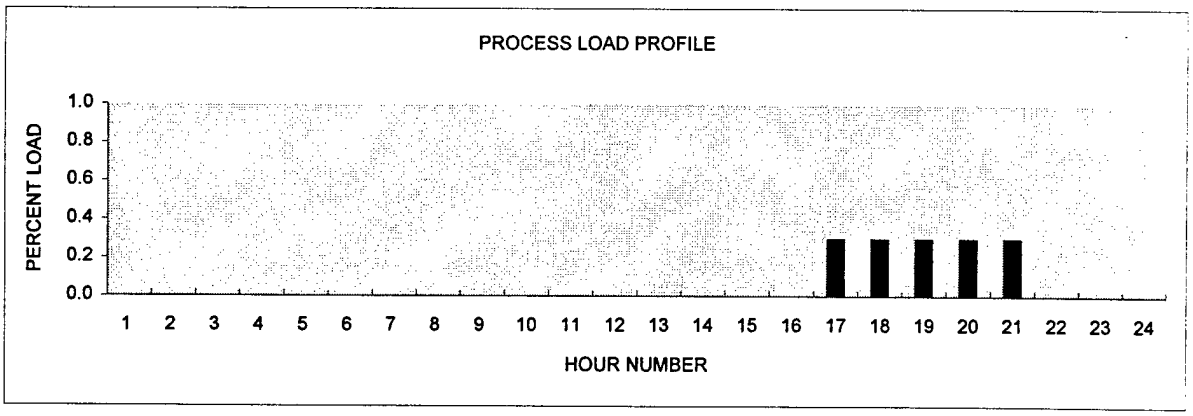
PROJECT: LIMITED ENERGY STUDY
CLIENT CONTRACT NO.: DACA 01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 651ZN1
BLDG: 651
ZONE: 1

BLDG TYPE	BLDG FUNCTION	TYPE OF PROFILE	HOUR NUMBER																							
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	Barracks	OCCUPANC	1.0	1.0	1.0	1.0	1.0	1.0	0.6	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.8	0.8	0.5	0.5	0.8	1.0	1.0	1.0
		LIGHTING	0.2	0.2	0.2	0.2	0.4	0.8	1.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.8	1.0	1.0	1.0	0.8	0.2	0.2
		PROCESS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0







V:\1406.011\COLECTD\FIELD\PLE\651Z1.XLS

BLDG 651 - BARRACKS WITH A/C - BASELINE

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 437184.000000
FLOOR AREA (SQFT) 40986.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 1664120.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -891200.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 409860.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 3167.000000
INFILTRATION PROFILE

.670	.670	.670	.670	.670	.670	.670	.670
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.670	.670	.670	.670	.670	.670

A FACTOR IN INFILTRATION EQUATION (CINA) 4.350000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 231200.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 0.000000E+00
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 47.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	8613.0	1828.0	8541.0	1826.0
WINDOW AREA SQFT (AWND)	435.0	18.5	467.0	17.2
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	43.5	1.9	46.7	1.7
WIDTH OF OVERHANG (WOH)	2.5	2.5	2.5	2.5
OVERHANG HGT ABV WNDW(HOH)	1.0	1.0	1.0	1.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.194	.193	.194	.194
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01454	.01447	.01454	.01454
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00002	.00002	.00002	.00002
N=2	.00224	.00223	.00224	.00224
N=3	.00805	.00801	.00805	.00805
N=4	.00394	.00392	.00394	.00394
N=5	.00029	.00029	.00029	.00029
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	-.07415	-.07415	-.07415	-.07415
N=5	.00212	.00212	.00212	.00212
N=6	********	********	********	********

ROOF AREA SQFT (AROF) 13662.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 6.500000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.078409E-03
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .111E-03 .561E-03 .369E-03 .369E-04 738.
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.46 .533 -.611E-01 .820E-03 999.
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.300000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	24.	47268.	31250.	25000.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.200	.000	1.000	1.000	72.0	76.0
2	.200	.000	1.000	1.000	72.0	76.0
3	.200	.000	1.000	1.000	72.0	76.0
4	.200	.000	1.000	1.000	72.0	76.0
5	.400	.000	1.000	1.000	72.0	76.0
6	.800	.000	1.000	1.000	72.0	76.0
7	1.000	.000	.800	.800	72.0	76.0
8	.200	.000	.400	.400	72.0	76.0

9	.200	.000	.100	.100	72.0	76.0
10	.200	.000	.100	.100	72.0	76.0
11	.200	.000	.100	.100	72.0	76.0
12	.200	.000	.100	.100	72.0	76.0
13	.200	.000	.100	.100	72.0	76.0
14	.200	.000	.100	.100	72.0	76.0
15	.200	.000	.100	.100	72.0	76.0
16	.400	.000	.300	.300	72.0	76.0
17	.800	.300	.800	.800	72.0	76.0
18	1.000	.300	.800	.800	72.0	76.0
19	1.000	.300	.500	.500	72.0	76.0
20	1.000	.300	.500	.500	72.0	76.0
21	1.000	.300	.800	.800	72.0	76.0
22	.800	.000	1.000	1.000	72.0	76.0
23	.200	.000	1.000	1.000	72.0	76.0
24	.200	.000	1.000	1.000	72.0	76.0

NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 68.000000
SYSTEM TYPE, (IECN) 9
SUPPLY AIR CFM (SACFM) 27148.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.000000
SYSTEM MIXED AIR TEMP(TMXAIR) 55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.000000E-01
VAV TYPE (IVAV) 1
VAV MINIMUM SUPPLY AIR FRACTION (ARMIN) 2.500000E-01
VAV COLD DECK TEMPERATURE F (TCD) 58.000000
VAV FAN PART LOAD FACTORS

.000	.560	.200	.560	.300	.620	.400	.700
.500	.770	.600	.830	.700	.880	.800	.930
.900	.980	1.00	1.00				

HEATING PLANT RATED OUTPUT BTU (HFLOT) 1700000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 2125000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)

.100	.191	.200	.286	.300	.369	.400	.451
.500	.537	.600	.625	.700	.718	.800	.812
.900	.906	1.00	1.00				

CHILLER TYPE (ITYPCH) 0
COOLING PLANT RATED OUTPUT BTU (CFLOT) 892000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 164905.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)

.100	.200	.200	.250	.300	.310	.400	.370
.500	.450	.600	.550	.700	.650	.800	.760
.900	.880	1.00	1.00				

BLDG 651 - BARRACKS WITH A/C - BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	14.	0.	0.	0.	0.	0.	0.	0.
	-506.	LOSS		-27.	-1.	0.	-95.	-14.	-445.	0.
FEB	0.	GAIN	16.	0.	0.	0.	0.	0.	0.	0.
	-418.	LOSS		-24.	-1.	0.	-72.	-12.	-381.	0.
MAR	1.	GAIN	21.	0.	0.	0.	4.	0.	0.	0.
	-354.	LOSS		-20.	-1.	0.	-59.	-11.	-349.	0.
APR	15.	GAIN	20.	0.	0.	0.	12.	0.	2.	6.
	-163.	LOSS		-12.	-1.	0.	-29.	-7.	-203.	0.
MAY	55.	GAIN	23.	0.	0.	0.	22.	0.	5.	22.
	-38.	LOSS		-5.	0.	0.	-11.	-4.	-110.	0.
JUN	201.	GAIN	23.	1.	0.	0.	32.	1.	13.	115.
	-1.	LOSS		-1.	0.	0.	-4.	-2.	-49.	0.
JUL	303.	GAIN	23.	3.	0.	0.	44.	2.	34.	163.
	0.	LOSS		0.	0.	0.	-2.	-1.	-28.	0.
AUG	275.	GAIN	20.	2.	0.	0.	37.	1.	24.	156.
	-1.	LOSS		0.	0.	0.	-2.	-1.	-30.	0.
SEP	152.	GAIN	17.	0.	0.	0.	22.	1.	13.	89.
	-44.	LOSS		-4.	0.	0.	-10.	-3.	-87.	0.
OCT	21.	GAIN	16.	0.	0.	0.	7.	0.	2.	10.
	-153.	LOSS		-12.	-1.	0.	-31.	-6.	-187.	0.
NOV	2.	GAIN	13.	0.	0.	0.	2.	0.	0.	1.
	-273.	LOSS		-18.	-1.	0.	-55.	-9.	-273.	0.
DEC	0.	GAIN	12.	0.	0.	0.	0.	0.	0.	0.
	-496.	LOSS		-28.	-1.	0.	-95.	-14.	-428.	0.
TOT	1025.	GAIN	218.	6.	0.	0.	180.	4.	92.	561.
	-2448.	LOSS		-154.	-8.	0.	-465.	-84.	-2569.	0.

MAX HEATING LOAD= -1457619. BTUH ON DEC 18 HOUR 9 AMBIENT TEMP 3.
MAX COOLING LOAD= 891200. BTUH ON SEP 2 HOUR 16 AMBIENT TEMP 91.

ZONE UA BTU/HR-F 5551.3

BLDG 651 - BARRACKS WITH A/C - BASELINE

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	72.	73.		4	14	64.	8.24	5.11	2.94	47.40
			72.	31	24	33.				
FEB	72.	74.		9	22	64.	7.44	4.62	2.65	42.81
			72.	28	24	34.				
MAR	72.	77.		24	23	68.	8.24	5.11	2.94	47.40
			72.	28	10	68.				
APR	73.	77.		26	12	72.	7.97	4.95	2.89	45.92
			72.	2	12	69.				
MAY	74.	77.		31	2	67.	8.24	5.11	3.26	47.72
			72.	28	6	60.				
JUN	76.	77.		23	9	71.	7.97	4.95	3.72	46.74
			72.	19	6	59.				
JUL	76.	77.		14	18	91.	8.24	5.11	4.72	49.18
			73.	10	6	60.				
AUG	76.	77.		6	5	67.	8.24	5.11	4.18	48.64
			72.	26	7	60.				
SEP	75.	77.		2	4	73.	7.97	4.95	3.49	46.51
			72.	17	10	68.				
OCT	73.	77.		6	2	67.	8.24	5.11	2.98	47.44
			72.	12	13	70.				
NOV	72.	77.		8	11	72.	7.97	4.95	2.84	45.87
			72.	21	15	68.				
DEC	72.	72.		31	24	42.	8.24	5.11	2.94	47.40
			72.	23	15	70.				
YEAR							97.00	60.18	39.55	563.03

BLDG 651 - BARRACKS WITH A/C - BASELINE

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	740	744	0	0	-.1360E+07	.0000
FEB	658	672	0	0	-.1225E+07	.0000
MAR	671	744	2	0	-.1274E+07	.2883E+06
APR	436	720	3	0	-.7666E+06	.3302E+06
MAY	184	744	0	0	-.4968E+06	.5460E+06
JUN	14	720	0	0	-.2036E+06	.8547E+06
JUL	0	744	0	21	.0000	.8912E+06
AUG	13	744	0	0	-.2271E+06	.8638E+06
SEP	186	720	4	2	-.4449E+06	.8912E+06
OCT	475	744	7	0	-.6624E+06	.4621E+06
NOV	633	720	5	0	-.9277E+06	.2627E+06
DEC	744	744	3	0	-.1458E+07	.0000
YEAR	4754	8760	24	23	-.1458E+07	.8912E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	716.20	.00	8.24	5.11	2.03	47.40	26.9
FEB	602.55	.00	7.44	4.62	1.84	42.81	26.9
MAR	537.85	.07	8.24	5.11	2.03	47.40	42.2
APR	280.24	.91	7.97	4.95	1.98	45.92	44.4
MAY	86.06	3.01	8.24	5.11	2.10	47.72	55.0
JUN	5.30	10.17	7.97	4.95	2.15	46.74	74.1
JUL	.00	15.51	8.24	5.11	2.38	49.18	77.1
AUG	4.98	13.84	8.24	5.11	2.29	48.64	74.7
SEP	93.32	7.66	7.97	4.95	2.10	46.51	76.4
OCT	278.16	1.14	8.24	5.11	2.04	47.44	49.5
NOV	442.93	.10	7.97	4.95	1.97	45.87	39.9
DEC	706.60	.00	8.24	5.11	2.03	47.40	26.9
YEAR	3754.18	52.40	97.00	60.18	24.96	563.03	77.1

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 107585. BTU/(SQFT-YEAR)

BLDG 651 - BARRACKS WITH A/C - BASELINE

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.1360E+07
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.1225E+07
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.2883E+06	-.1274E+07
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.3302E+06	-.7666E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.5460E+06	-.4968E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.8547E+06	-.2036E+06
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.8912E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.8638E+06	-.2271E+06
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.8912E+06	-.4449E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.4621E+06	-.6624E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.2627E+06	-.9277E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.1458E+07

BLDG 651 - BARRACKS WITH A/C - ECO-1 INSTALL 3.5" FIBERGLASS BATT INSUL.

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******

FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 437184.000000
FLOOR AREA (SQFT) 40986.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 1664120.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -891200.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 409860.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 3167.000000
INFILTRATION PROFILE

.670	.670	.670	.670	.670	.670	.670	.670
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.670	.670	.670	.670	.670	.670

A FACTOR IN INFILTRATION EQUATION (CINA) 4.350000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 231200.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 0.000000E+00
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 47.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	8613.0	1828.0	8541.0	1826.0
WINDOW AREA SQFT (AWND)	435.0	18.5	467.0	17.2
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	43.5	1.9	46.7	1.7
WIDTH OF OVERHANG (WOH)	2.5	2.5	2.5	2.5
OVERHANG HGT ABV WNDW(HOH)	1.0	1.0	1.0	1.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.060	.060	.060	.060
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00165	.00165	.00165	.00165
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00015	.00015	.00015	.00015
N=3	.00081	.00081	.00081	.00081
N=4	.00062	.00062	.00062	.00062
N=5	.00008	.00008	.00008	.00008
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	-.16643	-.16643	-.16643	-.16643
N=5	.00728	.00728	.00728	.00728
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 13662.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 6.500000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.078409E-03
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .111E-03 .561E-03 .369E-03 .369E-04 738.
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.46 .533 -.611E-01 .820E-03 999.
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.300000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	BTU/HR			THERMOSTAT SET POINT DEG F	
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	24.	47268.	31250.	25000.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.200	.000	1.000	1.000	72.0	76.0
2	.200	.000	1.000	1.000	72.0	76.0
3	.200	.000	1.000	1.000	72.0	76.0
4	.200	.000	1.000	1.000	72.0	76.0
5	.400	.000	1.000	1.000	72.0	76.0
6	.800	.000	1.000	1.000	72.0	76.0
7	1.000	.000	.800	.800	72.0	76.0
8	.200	.000	.400	.400	72.0	76.0

```
  9        .200      .000      .100      .100        72.0       76.0
 10        .200      .000      .100      .100        72.0       76.0
 11        .200      .000      .100      .100        72.0       76.0
 12        .200      .000      .100      .100        72.0       76.0
 13        .200      .000      .100      .100        72.0       76.0
 14        .200      .000      .100      .100        72.0       76.0
 15        .200      .000      .100      .100        72.0       76.0
 16        .400      .000      .300      .300        72.0       76.0
 17        .800      .300      .800      .800        72.0       76.0
 18       1.000      .300      .800      .800        72.0       76.0
 19       1.000      .300      .500      .500        72.0       76.0
 20       1.000      .300      .500      .500        72.0       76.0
 21       1.000      .300      .800      .800        72.0       76.0
 22        .800      .000     1.000     1.000        72.0       76.0
 23        .200      .000     1.000     1.000        72.0       76.0
 24        .200      .000     1.000     1.000        72.0       76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       68.000000
SYSTEM TYPE, (IECN)           9
SUPPLY AIR CFM (SACFM)    27148.000000
ECONOMIZER HIGH TEMP LIMIT F        68.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.000000E-01
VAV TYPE (IVAV)            1
VAV MINIMUM SUPPLY AIR FRACTION (ARMIN)     2.500000E-01
VAV COLD DECK TEMPERATURE  F  (TCD)        58.000000
VAV FAN PART LOAD FACTORS
 .000      .560      .200      .560      .300      .620      .400      .700
 .500      .770      .600      .830      .700      .880      .800      .930
 .900      .980      1.00      1.00
HEATING PLANT RATED OUTPUT BTU (HFLOT) 1700000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)  2125000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906      1.00      1.00
CHILLER TYPE (ITYPCH)            0
COOLING PLANT RATED OUTPUT BTU (CFLOT)   892000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)   164905.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .100      .200      .200      .250      .300      .310      .400      .370
 .500      .450      .600      .550      .700      .650      .800      .760
 .900      .880      1.00      1.00
```

BLDG 651 - BARRACKS WITH A/C - ECO-1 INSTALL 3.5" FIBERGLASS BATT INSUL.

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	14.	0.	0.	0.	0.	0.	0.	0.
	-436.	LOSS		-27.	-1.	0.	-29.	-14.	-441.	0.
FEB	0.	GAIN	16.	0.	0.	0.	0.	0.	0.	0.
	-365.	LOSS		-24.	-1.	0.	-22.	-12.	-378.	0.
MAR	1.	GAIN	21.	0.	0.	0.	0.	0.	0.	0.
	-312.	LOSS		-20.	-1.	0.	-17.	-11.	-346.	0.
APR	12.	GAIN	20.	0.	0.	0.	2.	0.	2.	5.
	-145.	LOSS		-12.	-1.	0.	-7.	-6.	-201.	0.
MAY	49.	GAIN	23.	0.	0.	0.	5.	0.	4.	23.
	-34.	LOSS		-5.	0.	0.	-1.	-4.	-108.	0.
JUN	182.	GAIN	23.	1.	0.	0.	9.	1.	12.	112.
	-1.	LOSS		-1.	0.	0.	0.	-2.	-47.	0.
JUL	270.	GAIN	23.	3.	0.	0.	13.	2.	33.	156.
	0.	LOSS		0.	0.	0.	0.	-1.	-27.	0.
AUG	246.	GAIN	20.	2.	0.	0.	11.	1.	23.	149.
	-1.	LOSS		0.	0.	0.	0.	-1.	-29.	0.
SEP	140.	GAIN	17.	0.	0.	0.	6.	1.	13.	88.
	-39.	LOSS		-4.	0.	0.	-2.	-3.	-86.	0.
OCT	19.	GAIN	16.	0.	0.	0.	1.	0.	2.	10.
	-133.	LOSS		-12.	-1.	0.	-8.	-6.	-185.	0.
NOV	1.	GAIN	13.	0.	0.	0.	0.	0.	0.	1.
	-234.	LOSS		-18.	-1.	0.	-16.	-9.	-272.	0.
DEC	0.	GAIN	12.	0.	0.	0.	0.	0.	0.	0.
	-426.	LOSS		-28.	-1.	0.	-29.	-14.	-425.	0.
TOT	920.	GAIN	218.	6.	0.	0.	46.	4.	90.	543.
	-2127.	LOSS		-153.	-8.	0.	-132.	-83.	-2546.	0.

MAX HEATING LOAD= -1254901. BTUH ON DEC 18 HOUR 2 AMBIENT TEMP 3.
MAX COOLING LOAD= 884639. BTUH ON JUL 14 HOUR 17 AMBIENT TEMP 92.

ZONE UA BTU/HR-F 2764.9

BEACON Energy Analysis By EMC Engineers, Inc. 651FG.I

BLDG 651 - BARRACKS WITH A/C - ECO-1 INSTALL 3.5" FIBERGLASS BATT INSUL.

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL INTERNAL HEAT GAIN MILLION BTU
JAN	72.	73.		4	14	64.	8.24	5.11	2.94	47.40
			72.	31	24	33.				
FEB	72.	74.		9	24	66.	7.44	4.62	2.65	42.81
			72.	28	24	34.				
MAR	72.	77.		24	23	68.	8.24	5.11	2.94	47.40
			72.	31	24	32.				
APR	73.	77.		27	16	74.	7.97	4.95	2.85	45.87
			72.	30	7	60.				
MAY	74.	77.		31	5	67.	8.24	5.11	2.99	47.45
			72.	3	8	66.				
JUN	76.	77.		14	10	67.	7.97	4.95	3.18	46.21
			72.	19	6	59.				
JUL	76.	77.		23	9	67.	8.24	5.11	3.93	48.39
			73.	10	5	57.				
AUG	76.	78.		24	5	67.	8.24	5.11	3.58	48.04
			72.	26	7	60.				
SEP	75.	77.		12	24	72.	7.97	4.95	3.15	46.17
			72.	30	24	51.				
OCT	73.	77.		6	15	71.	8.24	5.11	2.95	47.41
			72.	31	24	44.				
NOV	72.	77.		8	9	68.	7.97	4.95	2.84	45.87
			72.	21	15	68.				
DEC	72.	72.		23	14	70.	8.24	5.11	2.94	47.40
			72.	31	24	42.				
YEAR							97.00	60.18	36.95	560.42

BLDG 651 - BARRACKS WITH A/C - ECO-1 INSTALL 3.5" FIBERGLASS BATT INSUL.

	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED		NUMBER OF HOURS WHEN LOADS WERE NOT MET		MAXIMUM LOADS BTU	
MONTH	HEATING	COOLING INCLUDING ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	735	744	0	0	-.1177E+07	.0000
FEB	661	672	0	0	-.1070E+07	.0000
MAR	676	744	0	0	-.1103E+07	.2692E+06
APR	442	720	0	0	-.6380E+06	.3180E+06
MAY	184	744	0	0	-.4209E+06	.4276E+06
JUN	13	720	0	0	-.1752E+06	.7370E+06
JUL	0	744	0	0	.0000	.8846E+06
AUG	10	744	0	0	-.1974E+06	.7292E+06
SEP	191	720	0	0	-.3830E+06	.8104E+06
OCT	478	744	0	0	-.5727E+06	.3963E+06
NOV	619	720	3	0	-.7804E+06	.2610E+06
DEC	741	744	0	0	-.1255E+07	.0000
YEAR	4750	8760	3	0	-.1255E+07	.8846E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
MONTH	HEATING MILLION BTU	COOLING THOUSAND KWH	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FANS THOUSAND KWH	HEAT GAIN MILLION BTU	ELECTRIC DEMAND KW
JAN	640.30	.00	8.24	5.11	2.03	47.40	26.9
FEB	545.37	.00	7.44	4.62	1.84	42.81	26.9
MAR	496.60	.03	8.24	5.11	2.03	47.40	41.9
APR	263.43	.71	7.97	4.95	1.97	45.87	42.8
MAY	83.71	2.78	8.24	5.11	2.05	47.45	48.2
JUN	5.27	9.23	7.97	4.95	2.04	46.21	66.0
JUL	.00	13.73	8.24	5.11	2.24	48.39	72.6
AUG	4.09	12.39	8.24	5.11	2.17	48.04	65.5
SEP	90.99	7.05	7.97	4.95	2.03	46.17	67.1
OCT	258.84	1.07	8.24	5.11	2.04	47.41	44.6
NOV	398.44	.08	7.97	4.95	1.97	45.87	35.1
DEC	631.85	.00	8.24	5.11	2.03	47.40	26.9
YEAR	3418.90	47.06	97.00	60.18	24.44	560.42	72.6

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 98917. BTU/(SQFT-YEAR)

BLDG 651 - BARRACKS WITH A/C - ECO-1 INSTALL 3.5" FIBERGLASS BATT INSUL.

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	-	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.1177E+07
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.1070E+07
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.2692E+06	-.1103E+07
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.3180E+06	-.6380E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.4276E+06	-.4209E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.7370E+06	-.1752E+06
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.8846E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.7292E+06	-.1974E+06
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.8104E+06	-.3830E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.3963E+06	-.5727E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.2610E+06	-.7804E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.1255E+07

```
BLDG 651 - BARRACKS WITH A/C - ECO-2 INSTALL 1.5" RIGID INSULATION
----------  PROGRAM CONTROL OPTIONS -----------
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)            1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)            0
WEEKEND INTERNAL GAINS FACTOR (WKEND)         1.000000
LAST CASE FLAG (1=YES, 0=NO)  (LSTCS)            1
SKY CLEARNESS FACTOR (CLN)         1.000000
NUMBER OF ZONES (NZ)            1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)            0
--------- SITE AND BUILDING DATA --------------
******REAL WEATHER FROM DISK*******
 FILE NAME MO
STATION 13995   YEAR 1955
SITE LATITUDE DEG (AL1)        37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)      1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)        56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN)        20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA)     6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF)     3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG)     2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO)        70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)        70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS)     9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW)     0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS)    437184.000000
FLOOR AREA (SQFT)     40986.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX)  1664120.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX)  -891200.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA)    409860.000000
CONSTANT INFILTRATION RATE CFM (CFMI)      3167.000000
INFILTRATION PROFILE
 .670       .670       .670       .670       .670       .670       .670       .670
 1.00       1.00       1.00       1.00       1.00       1.00       1.00       1.00
 1.00       1.00       .670       .670       .670       .670       .670       .670
A FACTOR IN INFILTRATION EQUATION (CINA)     4.350000E-01
B FACTOR IN INFILTRATION EQUATION (CINB)     2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC)     8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP)    231200.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF)     0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF)     0.000000E+00
PARTITION UA BTU/HR-F (GUA)     0.000000E+00
DOOR UA BTU/HR-F (DUA)        47.000000
WINDOW GLASS NUMBER (NG)            30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO)     6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN)     6.930472E-01
WINDOW SHADING FACTOR (SHD)     5.900000E-01
```

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	8613.0	1828.0	8541.0	1826.0
WINDOW AREA SQFT (AWND)	435.0	18.5	467.0	17.2
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	43.5	1.9	46.7	1.7
WIDTH OF OVERHANG (WOH)	2.5	2.5	2.5	2.5
OVERHANG HGT ABV WNDW(HOH)	1.0	1.0	1.0	1.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.052	.052	.052	.052
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00165	.00165	.00165	.00165
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00018	.00018	.00018	.00018
N=3	.00084	.00084	.00084	.00084
N=4	.00056	.00056	.00056	.00056
N=5	.00006	.00006	.00006	.00006
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	-.14508	-.14508	-.14508	-.14508
N=5	.00613	.00613	.00613	.00613
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 13662.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 6.500000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.078409E-03
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .111E-03 .561E-03 .369E-03 .369E-04 738.
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.46 .533 -.611E-01 .820E-03 999.
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.300000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	BTU/HR			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	24.	47268.	31250.	25000.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.200	.000	1.000	1.000	72.0	76.0
2	.200	.000	1.000	1.000	72.0	76.0
3	.200	.000	1.000	1.000	72.0	76.0
4	.200	.000	1.000	1.000	72.0	76.0
5	.400	.000	1.000	1.000	72.0	76.0
6	.800	.000	1.000	1.000	72.0	76.0
7	1.000	.000	.800	.800	72.0	76.0
8	.200	.000	.400	.400	72.0	76.0

```
  9         .200      .000      .100      .100        72.0        76.0
 10         .200      .000      .100      .100        72.0        76.0
 11         .200      .000      .100      .100        72.0        76.0
 12         .200      .000      .100      .100        72.0        76.0
 13         .200      .000      .100      .100        72.0        76.0
 14         .200      .000      .100      .100        72.0        76.0
 15         .200      .000      .100      .100        72.0        76.0
 16         .400      .000      .300      .300        72.0        76.0
 17         .800      .300      .800      .800        72.0        76.0
 18        1.000      .300      .800      .800        72.0        76.0
 19        1.000      .300      .500      .500        72.0        76.0
 20        1.000      .300      .500      .500        72.0        76.0
 21        1.000      .300      .800      .800        72.0        76.0
 22         .800      .000     1.000     1.000        72.0        76.0
 23         .200      .000     1.000     1.000        72.0        76.0
 24         .200      .000     1.000     1.000        72.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       68.000000
SYSTEM TYPE, (IECN)           9
SUPPLY AIR CFM (SACFM)    27148.000000
ECONOMIZER HIGH TEMP LIMIT F        68.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.000000E-01
VAV TYPE (IVAV)             1
VAV MINIMUM SUPPLY AIR FRACTION (ARMIN)     2.500000E-01
VAV COLD DECK TEMPERATURE  F  (TCD)        58.000000
VAV FAN PART LOAD FACTORS
 .000      .560      .200      .560      .300      .620      .400      .700
 .500      .770      .600      .830      .700      .880      .800      .930
 .900      .980     1.00      1.00
HEATING PLANT RATED OUTPUT BTU (HFLOT) 1700000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)  2125000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)             0
COOLING PLANT RATED OUTPUT BTU (CFLOT)    892000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    164905.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .100      .200      .200      .250      .300      .310      .400      .370
 .500      .450      .600      .550      .700      .650      .800      .760
 .900      .880     1.00      1.00
```

BLDG 651 - BARRACKS WITH A/C - ECO-2 INSTALL 1.5" RIGID INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	14.	0.	0.	0.	0.	0.	0.	0.
	-432.	LOSS		-27.	-1.	0.	-25.	-14.	-441.	0.
FEB	0.	GAIN	16.	0.	0.	0.	0.	0.	0.	0.
	-362.	LOSS		-24.	-1.	0.	-19.	-12.	-378.	0.
MAR	1.	GAIN	21.	0.	0.	0.	0.	0.	0.	0.
	-310.	LOSS		-20.	-1.	0.	-15.	-11.	-346.	0.
APR	12.	GAIN	20.	0.	0.	0.	2.	0.	2.	5.
	-144.	LOSS		-12.	-1.	0.	-7.	-6.	-201.	0.
MAY	48.	GAIN	23.	0.	0.	0.	4.	0.	4.	22.
	-33.	LOSS		-5.	0.	0.	-1.	-4.	-108.	0.
JUN	181.	GAIN	23.	1.	0.	0.	8.	1.	12.	111.
	-1.	LOSS		-1.	0.	0.	0.	-2.	-47.	0.
JUL	267.	GAIN	23.	3.	0.	0.	11.	2.	33.	156.
	0.	LOSS		0.	0.	0.	0.	-1.	-27.	0.
AUG	245.	GAIN	20.	2.	0.	0.	9.	1.	23.	148.
	-1.	LOSS		0.	0.	0.	0.	-1.	-30.	0.
SEP	139.	GAIN	17.	0.	0.	0.	5.	1.	13.	87.
	-39.	LOSS		-4.	0.	0.	-2.	-3.	-86.	0.
OCT	19.	GAIN	16.	0.	0.	0.	1.	0.	2.	10.
	-132.	LOSS		-12.	-1.	0.	-7.	-6.	-185.	0.
NOV	1.	GAIN	13.	0.	0.	0.	0.	0.	0.	1.
	-232.	LOSS		-18.	-1.	0.	-14.	-9.	-272.	0.
DEC	0.	GAIN	12.	0.	0.	0.	0.	0.	0.	0.
	-422.	LOSS		-28.	-1.	0.	-25.	-14.	-425.	0.
TOT	914.	GAIN	218.	6.	0.	0.	40.	4.	90.	540.
	-2109.	LOSS		-153.	-8.	0.	-115.	-83.	-2545.	0.

MAX HEATING LOAD= -1247297. BTUH ON DEC 18 HOUR 2 AMBIENT TEMP 3.
MAX COOLING LOAD= 881233. BTUH ON JUL 14 HOUR 17 AMBIENT TEMP 92.

ZONE UA BTU/HR-F 2598.4

BLDG 651 - BARRACKS WITH A/C - ECO-2 INSTALL 1.5" RIGID INSULATION

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	72.	73.		4	14	64.	8.24	5.11	2.94	47.40
			72.	31	24	33.				
FEB	72.	74.		9	24	66.	7.44	4.62	2.65	42.81
			72.	28	24	34.				
MAR	72.	76.		24	22	68.	8.24	5.11	2.94	47.40
			72.	31	24	32.				
APR	73.	77.		27	16	74.	7.97	4.95	2.85	45.87
			72.	30	7	60.				
MAY	74.	77.		31	3	67.	8.24	5.11	3.00	47.45
			72.	28	6	60.				
JUN	76.	77.		6	1	67.	7.97	4.95	3.21	46.23
			72.	19	6	59.				
JUL	76.	77.		13	24	72.	8.24	5.11	3.89	48.35
			73.	10	5	57.				
AUG	76.	78.		24	5	67.	8.24	5.11	3.55	48.01
			72.	26	7	60.				
SEP	75.	77.		13	9	72.	7.97	4.95	3.16	46.18
			72.	30	24	51.				
OCT	73.	77.		6	15	71.	8.24	5.11	2.95	47.41
			72.	31	24	44.				
NOV	72.	77.		8	9	68.	7.97	4.95	2.84	45.87
			72.	21	15	68.				
DEC	72.	72.		23	14	70.	8.24	5.11	2.94	47.40
			72.	31	24	42.				
YEAR							97.00	60.18	36.91	560.39

BLDG 651 - BARRACKS WITH A/C - ECO-2 INSTALL 1.5" RIGID INSULATION

	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED		NUMBER OF HOURS WHEN LOADS WERE NOT MET		MAXIMUM LOADS BTU	
MONTH	HEATING	COOLING INCLUDING ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	735	744	0	0	-.1171E+07	.0000
FEB	660	672	0	0	-.1065E+07	.0000
MAR	676	744	0	0	-.1097E+07	.2922E+06
APR	441	720	0	0	-.6347E+06	.3181E+06
MAY	183	744	0	0	-.4201E+06	.4445E+06
JUN	13	720	0	0	-.1762E+06	.7336E+06
JUL	0	744	0	0	.0000	.8812E+06
AUG	10	744	0	0	-.1991E+06	.7256E+06
SEP	191	720	0	0	-.3822E+06	.8073E+06
OCT	478	744	0	0	-.5699E+06	.3932E+06
NOV	618	720	1	0	-.7750E+06	.2615E+06
DEC	741	744	0	0	-.1247E+07	.0000
YEAR	4746	8760	1	0	-.1247E+07	.8812E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
MONTH	HEATING MILLION BTU	COOLING THOUSAND KWH	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FANS THOUSAND KWH	HEAT GAIN MILLION BTU	ELECTRIC DEMAND KW
JAN	635.68	.00	8.24	5.11	2.03	47.40	26.9
FEB	542.07	.00	7.44	4.62	1.84	42.81	26.9
MAR	494.26	.05	8.24	5.11	2.03	47.40	42.2
APR	262.14	.71	7.97	4.95	1.97	45.87	42.8
MAY	83.28	2.73	8.24	5.11	2.05	47.45	49.0
JUN	5.27	9.19	7.97	4.95	2.04	46.23	65.8
JUL	.00	13.61	8.24	5.11	2.23	48.35	72.4
AUG	4.10	12.32	8.24	5.11	2.16	48.01	65.2
SEP	90.94	6.98	7.97	4.95	2.03	46.18	66.9
OCT	257.91	1.07	8.24	5.11	2.04	47.41	44.6
NOV	396.39	.08	7.97	4.95	1.97	45.87	35.2
DEC	627.48	.00	8.24	5.11	2.03	47.40	26.9
YEAR	3399.52	46.74	97.00	60.18	24.43	560.39	72.4

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 98416. BTU/(SQFT-YEAR)

BLDG 651 - BARRACKS WITH A/C - ECO-2 INSTALL 1.5" RIGID INSULATION

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM DRIFT DEG. F +	DRIFT DEG. F -	HOURS WHEN SYSTEM NOT MET COOL	HOURS WHEN LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.1171E+07
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.1065E+07
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.2922E+06	-.1097E+07
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.3181E+06	-.6347E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.4445E+06	-.4201E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.7336E+06	-.1762E+06
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.8812E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.7256E+06	-.1991E+06
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.8073E+06	-.3822E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.3932E+06	-.5699E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.2615E+06	-.7750E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.1247E+07

BUILDING MANAGER INTERVIEW

BUILDING INFORMATION:							
Building No:	651	Building Name:	Barracks				
Surveyed by:	DMS	Date:	11/9/95	Building Use:	Living Quarters		
Building Contact:				Phone No:			
Building Contact:				Phone No:			
OCCUPANCY:							
Number of Occupants:	Mon./Fri.:	125	Schedule:	0	To	2400	
	Tues./Thurs	125		0	To	2400	
	Wed.	125		0	To	2400	
	Sat./Sun.	125		0	To	2400	
Visitors Per Day:	Mon./Fri.:		Schedule:		To		
	Tues./Thurs.				To		
	Wed.				To		
	Sat./Sun.				To		
Comments:							
LIGHTING SCHEDULE:							
Normal Occupancy:	Mon.-Fri.:		Schedule:	500	To	2200	
	Sat./Sun.:			500	To	2200	
Cleaning Crew/2nd Shift:	Mon.-Fri.:		Schedule:		To		
	Sat./Sun.:				To		
EQUIPMENT SCHEDULE:							
Fan/AHU Schedule:	Mon.-Fri.:		Schedule:	0	To	2400	
	Sat./Sun.:			0	To	2400	
Chiller Schedule:	Mon.-Fri.:		Schedule:	0	To	2400	
	Sat./Sun.:			0	To	2400	
Boiler Schedule:	Mon.-Fri.:		Schedule:	0	To	2400	
	Sat./Sun.:			0	To	2400	
Aux. Equipment Schedule:							
	Mon.-Fri.:		Schedule:		To		
	Sat./Sun.:				To		
	Mon.-Fri.:		Schedule:		To		
	Sat./Sun.:				To		
Comments:							

Building No 651 **Building Name:** Barracks

BUILDING ENVELOPE

EXTERIOR WALLS

Wall Direction (N, E, W, or S)	Wall Construction No.	Comments
N	XW-1	
E	XW-1	
S	XW-1	
W	XW-1	

LIST OF EXT. WALL CONSTRUCTION TYPES

Wall Construction No.	Description
XW-1	Face Brick & CMU
XW-2	Face Brick, CMU, & Gyp. Board
XW-3	Face Brick, CMU, & Ceramic Tile
XW-4	Face Brick, CMU, & Plaster Coat
XW-5	Insulated Metal Panel

WINDOWS

Window Direction (N, E, W, or S)	Window Construction No.	Comments
N	W-1	
E	W-1	
S	W-1	
W	W-1	
		GENERAL: Top third of window frame is an
		insulated metal panel.

LIST OF WINDOW TYPES

Window Construction No.	Description
W-1	Double Pane Clear
W-2	Double Pane Tinted
W-3	Single Pane with Storm Windows
W-4	Single Pane

ROOF CONSTRUCTION

Roof Location	Roof Construction No.	Comments
ALL	R-7	

LIST OF ROOF CONSTRUCTION TYPES

Roof Construction No.	Description
R-1	BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile
R-2	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Ceiling Tile
R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Clg
R-4	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plaster Clg.
R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceiling Tile
R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaster Clg.
R-7	BUR, Rigid Insul., 7-1/2" Concrete Slab

Building No 651 **Building Name:** Barracks

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

INTERIOR EQUIPMENT AND OBJECTS				LIST OF EQUIPMENT AND OBJECTS	
Wall Direction (N, E, W, or S)	Item No.	No. of Items	Comments	Item No.	Description
					Architectural
				A-1	Interior Partitions
N	M-3	45		A-2	Wall Placards
N	E-3	9		A-3	Drapery Valances
N	E-2	6		A-4	Drapery Rods
N	A-5	6		A-5	Stainless Steel Shelf in Latrine
N	A-6	6	Glazed structural block 5'-0" A.F.F. in latrine	A-6	Dryer Vents
N	E-1	3			
					Plumbing
E	M-3	6		P-1	Sinks
				P-2	Commodes
S	E-3	6	Glazed structural block 9'-0" A.F.F. in laundry	P-3	Toilet Stalls
S	M-3	45		P-4	Water Fountains
S	P-5	3		P-5	Slop Sink
W	E-2	6			**HVAC Mechanical**
W	M-3	3		M-1	Floor Supply/Return Grilles
				M-2	Ceiling Supply/Return Grilles
				M-3	Finned-Tube Baseboard Radiators
				M-4	Thermostats / Space Temp. Sensors
				M-5	Wall mounted convection type heater
					Electrical
				E-1	Electrical Panels
				E-2	Electrical Outlets
				E-3	Electrical Light Switches
				E-4	Electrican Conduit
				E-5	Emergency light
				E-6	Electrical Disconnect
					Lighting
				L-1	Wall Mounted Fixtures
				L-2	Ceiling Mounted Fixtures
				L-3	Exit Signs
					Fire Protection
				F-1	Alarm Pull Switches
				F-2	Alarm Sound Devices (Speakers, Bells)
				F-3	Sprinkler Heads
				F-4	Fire Extinguishes
					Communication
				C-1	Telephones - Wall Mounted
				C-2	Telephones - Booth Mounted
				C-3	Telephone Jacks

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD
BLDG: **651**

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE:

AIR HANDLING UNIT SURVEY OBSERVATIONS

VAV-1	AHU NO.	**MER**	LOCATION (RM)
C.PLANT	REF. SYS. SERVING AHU	**SOUTH**	SERVES AREA

UNIT TYPE:

	SINGLE ZN		2-PIPE FC		4-PIPE FC		UNIT HTR		H&V
	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION	X	VAV
	NUMBER OF ZONES			45	OTHER	VAV BOXES			
	COMMENT:								

NAMEPLATE:

					MFG.				MODEL
15.0	SUPPLY FAN HP		**MARATHON**		MFG.	**DD254TTDR7343CCW**			MODEL
3.0	RET/EXH FAN HP		**RELIANCE**		MFG.	**P18K13AMZ**			MODEL
13574	CFM-HTG	**13547**	CFM-CLG	**10%**	MIN %OA	**100%**	MAX %OA	**0.0%**	% HTG AREA SERVED
COMMENT:									

COILS:

X	NONE		STM		HW		ELEC		MOD VLV	PREHEAT
X	NONE		STM		HW		ELEC		MOD VLV	HEATING
X	NONE		STM		HW		ELEC		MOD VLV	REHEAT
X	NONE		STM		HW		EVAP MEDIA		MOD VLV	HUMID.
	NONE		DX	X	CW				MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	**0**	**0**	**0**	**0**	**0**	**0**	**0**	TIMECLOCK?
PRESENT STOP TIME	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**YES**
REQUIRED START TIME								**NO PINS IN TC**
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
				1	**1**	**1**	**1**	**1**			

CONTROLS:

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:	X	SINGLE STPT		DUAL SETPNT		SETBACK			
SPACE SETPOINT (°F):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	**N**	MIN OA (Y/N)	**Y**	MAX OA (Y/N)	**Y**	RA (Y/N)	**N**	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:		YES		NO					
COMMENTS:	**MANUAL OA DAMPER POSITION, LINKAGE GOOD**								

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE:

BLDG: **651**

AIR HANDLING UNIT SURVEY OBSERVATIONS

VAV-2	AHU NO.	**MER**	LOCATION (RM)
C.PLANT	REF. SYS. SERVING AHU	**NORTH**	SERVES AREA

UNIT TYPE:

	SINGLE ZN		2-PIPE FC		4-PIPE FC		UNIT HTR		H&V
	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION	X	VAV
	NUMBER OF ZONES		45		OTHER	AV BOXES			
	COMMENT:								

NAMEPLATE:

					MFG.				MODEL
15.0	SUPPLY FAN HP		**MARATHON**		MFG.	**DD254TTDR7343CCW**			MODEL
3.0	RET/EXH FAN HP		**RELIANCE**		MFG.	**P18K13AMZ**			MODEL
13574	CFM-HTG	**13547**	CFM-CLG	**10%**	MIN %OA	**100%**	MAX %OA	**0.0%**	% HTG AREA SERVED
COMMENT:									

COILS:

X	NONE		STM		HW		ELEC		MOD VLV	PREHEAT
X	NONE		STM		HW		ELEC		MOD VLV	HEATING
X	NONE		STM		HW		ELEC		MOD VLV	REHEAT
X	NONE		STM		HW		EVAP MEDIA		MOD VLV	HUMID.
	NONE		DX	X	CW				MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	**0**	**0**	**0**	**0**	**0**	**0**	**0**	TIMECLOCK?
PRESENT STOP TIME	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**YES**
REQUIRED START TIME								**NO PINS IN TC**
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
				1	**1**	**1**	**1**	**1**			

CONTROLS:

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:	X	SINGLE STPT		DUAL SETPNT		SETBACK			
SPACE SETPOINT (°F):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	**N**	MIN OA (Y/N)	**Y**	MAX OA (Y/N)	**Y**	RA (Y/N)	**N**	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:		YES		NO					
COMMENTS:	**MANUAL OA DAMPER POSITION, LINKAGE GOOD**								

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE:

BLDG: 651

PERIMETER RADIATION SURVEY OBSERVATIONS

RAD-1	PER RAD NO.	NORTH	LOCATION (RM)
CONV-1	SOURCE OF HEATING	NORTH	SERVES AREA

UNIT TYPE:

	STEAM	X	HW		ELECTRIC				
	OTHER								
	COMMENT:								

NAMEPLATE:

	HW PUMP 1 - HP		MFG.		MODEL
	HW PUMP 2 - HP		MFG.		MODEL
	HW PUMP 3 - HP		MFG.		MODEL
	HW PUMP 4 - HP		MFG.		MODEL
COMMENT:	SEE CONVERTER			40.0%	% AREA HEATING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1						1	1	1

CONTROLS:

		PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
RADIATION CONTROL:		NONE		2-WAY VLV		3-WAY VLV		OTHER	NO CONTROL
SPACE SETPOINT (°F):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
RESET CONTROL (°F):		HW HIGH		HW LOW		OA LOW		OA HIGH	
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE:

BLDG: **651**

PERIMETER RADIATION SURVEY OBSERVATIONS

RAD-2	PER RAD NO.	**NORTH**	LOCATION (RM)
CONV-2	SOURCE OF HEATING	NORTH	SERVES AREA

UNIT TYPE:

	STEAM	X	HW		ELECTRIC				
	OTHER								
	COMMENT:								

NAMEPLATE:

	HW PUMP 1 - HP		MFG.		MODEL
	HW PUMP 2 - HP		MFG.		MODEL
	HW PUMP 3 - HP		MFG.		MODEL
	HW PUMP 4 - HP		MFG.		MODEL
COMMENT:	SEE CONVERTER			40.0%	% AREA HEATING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1						1	1	1

CONTROLS:

		PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
RADIATION CONTROL:		NONE		2-WAY VLV		3-WAY VLV		OTHER	NO CONTROL
SPACE SETPOINT (°F):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
RESET CONTROL (°F):		HW HIGH		HW LOW		OA LOW		OA HIGH	
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD
BLDG: **651**

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE:

PERIMETER RADIATION SURVEY OBSERVATIONS

RAD-3	PER RAD NO.	**OTHER**	LOCATION (RM)
CONV-3	SOURCE OF HEATING	OTHER	SERVES AREA

UNIT TYPE:

	STEAM	X	HW		ELECTRIC				
	OTHER								
	COMMENT:								

NAMEPLATE:

	HW PUMP 1 - HP		MFG.		MODEL
	HW PUMP 2 - HP		MFG.		MODEL
	HW PUMP 3 - HP		MFG.		MODEL
	HW PUMP 4 - HP		MFG.		MODEL
COMMENT:	SEE CONVERTER			20.0%	% AREA HEATING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1						1	1	1

CONTROLS:

		PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
RADIATION CONTROL:		NONE		2-WAY VLV		3-WAY VLV		OTHER	NO CONTROL
SPACE SETPOINT (°F):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
RESET CONTROL (°F):		HW HIGH		HW LOW		OA LOW		OA HIGH	
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE:

BLDG: **651**

BOILER & CONVERTER SURVEY OBSERVATIONS

CV-1	BOILER/CONVERTER NO.	**MER**	LOCATION (RM)
C. PLANT	SOURCE OF HEATING (PLANT)	**ALL**	SERVES AREA

UNIT TYPE:

	STEAM		PSIG		HW		TEMP.	BOILER TYPE:
	NO.2 OIL		NO.6 OIL		N.GAS		ELEC	FUELS:
X	STM/HW		HTHW/HW		HTHW/STM		OTHER	CONVERTER TYPE:
X	SPACE HEAT		DHW		OTHER			USE:
COMMENT:							0%	% HTG AREA SERVED
								BB RADIATION ONLY

NAMEPLATE:

DUNHAM-BUSH	MFG.	**SCA-82**	MODEL	**936000**	CAPACITY OUTPUT (BTUH)
				936000	CAPACITY INPUT (BTUH)
	MFG.		MODEL		CAPACITY OUTPUT (BTUH)
					CAPACITY INPUT (BTUH)

0.75	HW PUMP 1 - HP	**GE**	MFG.	**5K38MG567**	MODEL
	HW PUMP 2 - HP		MFG.		MODEL
	HW PUMP 3 - HP		MFG.		MODEL

COMMENT:

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	**YES - NO PINS**
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1						1	1	1

CONTROLS:

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		PSIG		HW SUPPLY					
RESET CONTROL (oF):	160	HW HIGH	80	HW LOW	65	OA LOW	0	OA HIGH	
BURNER CONTROLS		O2 TRIM (Y/N)		OTHER					

COMMENTS: **CONTROLS IN GOOD CONDITION**

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD
BLDG: **651**

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE:

BOILER & CONVERTER SURVEY OBSERVATIONS

CV-2	BOILER/CONVERTER NO.	**MER**	LOCATION (RM)
C. PLANT	SOURCE OF HEATING (PLANT)	**ALL**	SERVES AREA

UNIT TYPE:

	STEAM		PSIG		HW		TEMP.		BOILER TYPE:
	NO.2 OIL		NO.6 OIL		N.GAS		ELEC		FUELS:
X	STM/HW		HTHW/HW		HTHW/STM		OTHER		CONVERTER TYPE:
X	SPACE HEAT		DHW		OTHER				USE:
COMMENT:							**0%**		% HTG AREA SERVED
									BB RADIATION ONLY

NAMEPLATE:

DUNHAM-BUSH	MFG.	**SCA-82**	MODEL	**933000**	CAPACITY OUTPUT (BTUH)	
				933000	CAPACITY INPUT (BTUH)	
	MFG.		MODEL		CAPACITY OUTPUT (BTUH)	
					CAPACITY INPUT (BTUH)	
0.75	HW PUMP 1 - HP	**GE**	MFG.	**5K43GG3265**		MODEL
	HW PUMP 2 - HP		MFG.			MODEL
	HW PUMP 3 - HP		MFG.			MODEL
COMMENT:						

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	**0**	**0**	**0**	**0**	**0**	**0**	**0**	TIMECLOCK?
PRESENT STOP TIME	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**YES - NO PINS**
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	**1**	**1**	**1**						**1**	**1**	**1**

CONTROLS:

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		PSIG		HW SUPPLY					
RESET CONTROL (oF):	**160**	HW HIGH	**80**	HW LOW	**65**	OA LOW	**0**	OA HIGH	
BURNER CONTROLS		O2 TRIM (Y/N)		OTHER					
COMMENTS:	**CONTROLS IN GOOD CONDITION**								

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE:

BLDG: **651**

BOILER & CONVERTER SURVEY OBSERVATIONS

CV-3	BOILER/CONVERTER NO.	**MER**	LOCATION (RM)
C. PLANT	SOURCE OF HEATING (PLANT)	**ALL**	SERVES AREA

UNIT TYPE:

	STEAM		PSIG		HW		TEMP.	BOILER TYPE:
	NO.2 OIL		NO.6 OIL		N.GAS		ELEC	FUELS:
X	STM/HW		HTHW/HW		HTHW/STM		OTHER	CONVERTER TYPE:
X	SPACE HEAT		DHW		OTHER			USE:
COMMENT:							0%	% HTG AREA SERVED
								BB RADIATION ONLY

NAMEPLATE:

DUNHAM-BUSH	MFG.	**SCA-42**	MODEL	**936000**	CAPACITY OUTPUT (BTUH)
				936000	CAPACITY INPUT (BTUH)
	MFG.		MODEL		CAPACITY OUTPUT (BTUH)
					CAPACITY INPUT (BTUH)
0.75	HW PUMP 1 - HP	**GE**	MFG.		MODEL
	HW PUMP 2 - HP		MFG.		MODEL
	HW PUMP 3 - HP		MFG.		MODEL
COMMENT:					

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	**0**	**0**	**0**	**0**	**0**	**0**	**0**	TIMECLOCK?
PRESENT STOP TIME	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**YES - NO PINS**
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	**1**	**1**	**1**						**1**	**1**	**1**

CONTROLS:

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		PSIG		HW SUPPLY					
RESET CONTROL (oF):	**160**	HW HIGH	**80**	HW LOW	**65**	OA LOW	**0**	OA HIGH	
BURNER CONTROLS		O2 TRIM (Y/N)		OTHER					
COMMENTS:	**CONTROLS IN GOOD CONDITION**								

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD
BLDG: **651**

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE:

REFRIGERATION EQUIPMENT SURVEY OBSERVATIONS

CWP-1	CHILLER/COMPRESSOR NO.	**MER**	LOCATION (RM)

UNIT TYPE:

	CENTRIFUGAL WITH WATER SIDE COOLING TOWER					X	OTHER **CHW PUMP**
	RECIPROCATING WITH WATER SIDE COOLING TOWER						AHU'S SERVED
	RECIPROCATING WITH AIR COOLED CONDENSING UNIT						
	ABSORBTION WITH WATER SIDE COOLING TOWER						
	AIR COOLED CONDENSING UNIT						
X	CHW		DX		OTHER		

NAMEPLATE:

CHILLER		MFG.				MODEL				SERIAL NO.
	VOLTS		AMPS		PH		HZ		CAPACITY (TONS)	
TOWER		MFG.				MODEL				# OF FANS
	VOLTS		AMPS		PH		HZ		HP each	
CW PUMP **MARATHON**		MFG.	**KVA145TTDR7644AEW**			MODEL				SERIAL NO.
208	VOLTS	**6.3**	AMPS	**3**	PH	**60**	HZ	**2**	HP	
CNW PUMP		MFG.				MODEL				SERIAL NO.
	VOLTS		AMPS		PH		HZ		HP	
COMMENTS:										

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
				1	1	1	1	1			

CONTROLS:

		PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		CWS (oF)		CWR (oF)		CNWS (oF)		CNWR (oF)	**NONE**
PANEL INDICATORS									
- PRESSURE		LITE-HI		LITE-LOW		GAUGES			
- TEMPERATURE		LITE-HI		LITE-LOW		GAUGES			
- OTHER									
COMMENTS:									

ANNUAL ENERGY SAVINGS SUMMARY
FOR BARRACKS WITHOUT A/C - BUILDINGS 730, 731, 736, 737, 738, 747, 748, 755, 756, 757, 815, 816, 817, 818, 819, 827, 828, 829, 830, & 831

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Baseline Annual Electric (MBtu)	ECO 1 - Annual Electric (MBtu)	Annual Electric Energy Savings (MBtu)	Baseline Peak Electric Demand (kW)	ECO 1 - Peak Electric Demand (kW)	Peak Electric Demand Savings (kW)	Baseline Nat. Gas Energy Savings (MBtu)	ECO 1 - Annual Nat. Gas (MBtu)	Annual Nat. Gas Energy Savings (MBtu)
730	0.00	0.00	0.00	24.20	24.20	0.00	3074.08	2812.35	261.73

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 730 (SF)	Square Foot Adjust-ment Factor	Annual Electric Energy Savings (MBtu)	Adjusted Annual Electric Energy Savings* (MBtu)	Peak Electric Demand Savings (kW)	Adjusted Peak Electric Demand Savings* (kW)	Annual Nat. Gas Energy Savings (MBtu)	Adjusted Annual Nat. Gas Energy Savings* (MBtu)
731	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
736	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
737	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
738	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
747	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
748	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
755	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
756	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
757	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
815	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
816	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
817	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
818	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
819	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
827	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
828	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
829	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
830	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
831	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73

*Energy savings prorated on a square foot basis

ANNUAL ENERGY SAVINGS SUMMARY
FOR BARRACKS WITHOUT A/C - BUILDINGS 730, 731, 736, 737, 738, 747, 748, 755, 756, 757, 815, 816, 817, 818, 819, 827, 828, 829, 830, & 831

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Baseline Annual Electric (MBtu)	ECO 2 - Annual Electric (MBtu)	Annual Electric Energy Savings (MBtu)	Baseline Peak Electric Demand (kW)	ECO 2 - Peak Electric Demand (kW)	Peak Electric Demand Savings (kW)	Baseline Annual Nat. Gas (MBtu)	ECO 2 - Annual Nat. Gas (MBtu)	Annual Nat. Gas Energy Savings (MBtu)
730	0.00	0.00	0.00	24.20	24.20	0.00	3074.08	2795.18	278.90

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 730 (SF)	Square Foot Adjust-ment Factor	Annual Electric Energy Savings (MBtu)	Adjusted Annual Electric Energy Savings* (MBtu)	Peak Electric Demand Savings (kW)	Adjusted Peak Electric Demand Savings* (kW)	Annual Nat. Gas Energy Savings (MBtu)	Adjusted Annual Nat. Gas Energy Savings* (MBtu)
731	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
736	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
737	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
738	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
747	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
748	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
755	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
756	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
757	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
815	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
816	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
817	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
818	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
819	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
827	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
828	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
829	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
830	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
831	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90

*Energy savings prorated on a square foot basis

INVESTMENT COST SUMMARY
FOR BARRACKS WITHOUT A/C - BUILDINGS 730, 731, 736, 737, 738, 747 748, 755, 756, 757, 815, 816, 817, 818, 819, 827, 828, 829, 830, & 831

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Investment Cost ($)
730	$178,577

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 730 (SF)	Square Foot Adjust-ment Factor	Investment Cost ($)*	Adjusted Investment Cost ($)*
731	40,640	40,640	1.000	$178,577	$178,577
736	40,640	40,640	1.000	$178,577	$178,577
737	40,640	40,640	1.000	$178,577	$178,577
738	40,640	40,640	1.000	$178,577	$178,577
747	40,640	40,640	1.000	$178,577	$178,577
748	40,640	40,640	1.000	$178,577	$178,577
755	40,640	40,640	1.000	$178,577	$178,577
756	40,640	40,640	1.000	$178,577	$178,577
757	40,640	40,640	1.000	$178,577	$178,577
815	40,640	40,640	1.000	$178,577	$178,577
816	40,640	40,640	1.000	$178,577	$178,577
817	40,640	40,640	1.000	$178,577	$178,577
818	40,640	40,640	1.000	$178,577	$178,577
819	40,640	40,640	1.000	$178,577	$178,577
827	40,640	40,640	1.000	$178,577	$178,577
828	40,640	40,640	1.000	$178,577	$178,577
829	40,640	40,640	1.000	$178,577	$178,577
830	40,640	40,640	1.000	$178,577	$178,577
831	40,640	40,640	1.000	$178,577	$178,577

*Investment Cost prorated on a square foot basis

INVESTMENT COST SUMMARY
FOR BARRACKS WITHOUT A/C - BUILDINGS 730, 731, 736, 737, 738, 747 748, 755, 756, 757, 815, 816, 817, 818, 819, 827, 828, 829, 830, & 831

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Investment Cost ($)
730	$183,884

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 730 (SF)	Square Foot Adjust-ment Factor	Investment Cost ($)	Adjusted Investment Cost ($)*
731	40,640	40,640	1.000	$183,884	$183,884
736	40,640	40,640	1.000	$183,884	$183,884
737	40,640	40,640	1.000	$183,884	$183,884
738	40,640	40,640	1.000	$183,884	$183,884
747	40,640	40,640	1.000	$183,884	$183,884
748	40,640	40,640	1.000	$183,884	$183,884
755	40,640	40,640	1.000	$183,884	$183,884
756	40,640	40,640	1.000	$183,884	$183,884
757	40,640	40,640	1.000	$183,884	$183,884
815	40,640	40,640	1.000	$183,884	$183,884
816	40,640	40,640	1.000	$183,884	$183,884
817	40,640	40,640	1.000	$183,884	$183,884
818	40,640	40,640	1.000	$183,884	$183,884
819	40,640	40,640	1.000	$183,884	$183,884
827	40,640	40,640	1.000	$183,884	$183,884
828	40,640	40,640	1.000	$183,884	$183,884
829	40,640	40,640	1.000	$183,884	$183,884
830	40,640	40,640	1.000	$183,884	$183,884
831	40,640	40,640	1.000	$183,884	$183,884

*Investment Cost prorated on a square foot basis

LIFE CYCLE COST ANALYSIS SUMMARY

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Leonard Wood	REGION: 2 (Missouri)		PROJECT NO:	1406-011
PROJECT TITLE:	Limited Energy Study, Insulate Brick Buildings			FISCAL YEAR:	1996
ANALYSIS DATE:	02/18/96	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz

1. INVESTMENT: **BLDG 730 - INSTALL 3.5" BATT INSULATION ON WALLS**

A.	CONSTRUCTION COST	=	$158,033	
B.	SIOH COST	(7.0% of 1A) =	$11,062	
C.	DESIGN COST	(6.0% of 1A) =	$9,482	
D.	TOTAL COST	(1A +1B +1C) =	$178,577	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT	=	$0	
F.	PUBLIC UTILITY COMPANY REBATE	=	$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$178,577

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96

	ENERGY SOURCE	FUEL COS $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$7.33	0.00	$0	13.80	$0	
B.	DIST	$0.00	0	$0	0.00	$0	
C.	NAT GAS	$5.30	261.73	$1,387	17.76	$24,636	
D.	COAL	$0.00	0	$0	0.00	$0	
E.	ELEC. DEMAND			$0	13.47	$0	
F.	TOTAL		261.73	$1,387		-------->	$24,636

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1	ANNUAL MAINTENANCE	$0	14.88	$0
2		$0	14.88	$0
3		$0	14.88	$0
4	TOTAL ANNUAL DISC. SAVINGS (+) / COST	$0		$0

B. NON-RECURRING (+/-)

	ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)
a.	BASELINE EQUIP. REPLCMNT.	$0	5		$0
b.					$0
c.					$0
d.					$0
e.					$0
f.	TOTAL	$0			$0

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = $0

4.	FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-)	(2F3+3A4+(3Bf1/Economic Life))	$1,387
5.	SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY)	(1G/4) =	128.73
6.	TOTAL NET DISCOUNTED SAVINGS	(2F5 + 3C) =	$24,636
7.	DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (MUST HAVE SIR > 1.25 TO QUALIFY)	(6/1G) =	0.14

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	SHEET 1 OF 1	
ENGINEER	E M C Engineers, Inc.	DATE PREPARED	18-Feb-96
	Denver, CO	ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST Quantity	Unit Cost	Total	LABOR COST Crew/ Worker	Hours/ Unit	Total	TOTAL
1		**BUILDING 730**								
2		**INSTALL 3.5" BATT INSULATION ON WALLS**								
3										
4										
5	I3-1/2I	INSTALL 3-1/2" BATT INSULATION	S.F.	20808.0	$0.18	$3,772	1-CARP	0.007	$3,827	$7,598
6	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	19798.0	$0.20	$3,966	2-CARP	0.017	$17,685	$21,651
7	ISW	INSTALL 2"x4" STUDDED WALL 2' OC	L.F.	12007.0	$0.24	$2,829	F-2	0.009	$5,955	$8,785
8	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	20808.0	$0.07	$1,390	1-PORD	0.01	$5,022	$6,412
9	R2SSS	RELOCATE 2' STAINLESS STEEL SHELF	EA.	6.0	$0.00	$0	1-CARP	0.533	$84	$84
10	R6WMH	RELOCATE 6' BASEBOARD RADIATION	EA.	99.0	$18.39	$1,821	Q-6	4.68	$40,526	$42,347
11	RDV	RELOCATE DRYER VENT	EA.	6.0	$11.45	$69	1-CARP	1.3	$205	$274
12	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	15.0	$8.82	$132	1-ELEC	0.844	$385	$518
13	REO	RELOCATE ELECTRICAL OUTLET	EA.	12.0	$7.97	$96	1-ELEC	0.896	$327	$423
14	REP	RELOCATE ELECTRICAL PANEL	EA.	3.0	$0.00	$0	1-ELEC	12.191	$1,113	$1,113
15	RSS	RELOCATE SLOP SINK	EA.	3.0	$38.33	$115	Q-1	5.67	$958	$1,073
16	IWB-5/8	INSTALL 5/8" WATERPRF BRD - TAPED & SANDE	S.F.	1010.0	$0.96	$965	2-CARP	0.02	$1,061	$2,026
17	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	1010.0	$1.83	$1,850	2-TILE	0.084	$4,109	$5,959
18										
19										
20										
21										
22										
23										
24										
25										
26										
27		**SUBTOTAL**				$17,004			$81,259	$98,263
28	DIFF	DIFFICULTLY FACTOR			5%				$4,063	$4,063
29		**SUBTOTAL**				$17,004			$85,322	$102,326
30	OH	OVERHEAD			17%	$2,891			$14,505	$17,395
31		**SUBTOTAL**				$19,895			$99,827	$119,722
32	PRO	PROFIT			10%	$1,989			$9,983	$11,972
33		**SUBTOTAL**				$21,884			$109,810	$131,694
34	CONT	CONTINGENCY			20%	$4,377			$21,962	$26,339
35	**TOTAL COST**					$26,261			$131,772	$158,033

LIFE CYCLE COST ANALYSIS SUMMARY

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Leonard Wood	REGION: 2 (Missouri)		PROJECT NO:	1406-011
PROJECT TITLE:	Limited Energy Study, Insulate Brick Buildings			FISCAL YEAR:	1996
ANALYSIS DATE:	02/18/96	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz

1. INVESTMENT: **BLDG 730 - INSTALL 1.5" RIGID INSULATION ON WALLS**

A.	CONSTRUCTION COST	=	$162,729	
B.	SIOH COST	(7.0% of 1A) =	$11,391	
C.	DESIGN COST	(6.0% of 1A) =	$9,764	
D.	TOTAL COST	(1A +1B +1C) =	$183,884	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT	=	$0	
F.	PUBLIC UTILITY COMPANY REBATE	=	$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$183,884

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96

	ENERGY SOURCE	FUEL COS $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$7.33	0	$0	13.80	$0	
B.	DIST	$0.00	0	$0		$0	
C.	NAT GAS	$5.30	278.90	$1,478	17.76	$26,252	
D.	COAL	$0.00	0	$0		$0	
E.	ELEC. DEMAND			$0	13.47	$0	
F.	TOTAL		278.90	$1,478		-------->	$26,252

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1	ANNUAL MAINTENANCE	$0	14.88	$0
2		$0	14.88	$0
3		$0	14.88	$0
4	TOTAL ANNUAL DISC. SAVINGS (+) / COST	$0		$0

B. NON-RECURRING (+/-)

ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)
a. BASELINE EQUIP. REPLCMNT.	$0			$0
b.				$0
c.				$0
d.				$0
e.				$0
f. TOTAL	$0			$0

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = $0

4.	FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-)	(2F3+3A4+(3Bf1/Economic Life))	$1,478
5.	SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY)	(1G/4) =	124.40
6.	TOTAL NET DISCOUNTED SAVINGS	(2F5 + 3C) =	$26,252
7.	DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (MUST HAVE SIR > 1.25 TO QUALIFY)	(6/1G) =	0.14

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood Wall, MO	SHEET 1 OF 1	
ENGINEER	E M C Engineers, Inc.	DATE PREPARED	18-Feb-96
	Denver, CO	ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST Quantity	Unit Cost	Total	LABOR COST Crew/ Worker	Hours/ Unit	Total	TOTAL
1		**BUILDING 730**								
2		**INSTALL 1.5" RIGID INSULATION ON WALLS**								
3										
4										
5	I1-1/2RI	INSTALL 1-1/2" RIGID INSULATION	S.F.	20808	$0.59	$12,308	1-CARP	0.008	$4,373	$16,681
6	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	19798	$0.20	$3,966	2-CARP	0.017	$17,685	$21,651
7	IFS	INSTALL 3/4"x2" FURRING STRIPS	L.F.	4767	$0.19	$910	1-CARP	0.016	$2,004	$2,913
8	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	20808	$0.07	$1,390	1-PORD	0.01	$5,022	$6,412
9	R2SSS	RELOCATE 2' STAINLESS STEEL SHELF	EA.	6.0	$0.00	$0	1-CARP	0.533	$84	$84
10	R6WMH	RELOCATE 6' BASEBOARD RADIATION	EA.	99.0	$18.39	$1,821	Q-6	4.68	$40,526	$42,347
11	RDV	RELOCATE DRYER VENT	EA.	6.0	$11.45	$69	1-CARP	1.3	$205	$274
12	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	15.0	$8.82	$132	1-ELEC	0.844	$385	$518
13	REO	RELOCATE ELECTRICAL OUTLET	EA.	12.0	$7.97	$96	1-ELEC	0.896	$327	$423
14	REP	RELOCATE ELECTRICAL PANEL	EA.	3.0	$0.00	$0	1-ELEC	12.191	$1,113	$1,113
15	RSS	RELOCATE SLOP SINK	EA.	3.0	$38.33	$115	Q-1	5.67	$958	$1,073
16	IWB-5/8	INSTALL 5/8" WATERPRF BRD - TAPED & SANDE	S.F.	1010.0	$0.96	$965	2-CARP	0.02	$1,061	$2,026
17	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	1010.0	$1.83	$1,850	2-TILE	0.084	$4,109	$5,959
18										
19										
20										
21										
22										
23										
24										
25										
26										
27		**SUBTOTAL**				$23,620			$77,855	$101,475
28	DIFF	DIFFICULTLY FACTOR			5%				$3,893	$3,893
29		**SUBTOTAL**				$23,620			$81,747	$105,367
30	OH	OVERHEAD			17%	$4,015			$13,897	$17,912
31		**SUBTOTAL**				$27,635			$95,644	$123,280
32	PRO	PROFIT			10%	$2,764			$9,564	$12,328
33		**SUBTOTAL**				$30,399			$105,209	$135,608
34	CONT	CONTINGENCY			20%	$6,080			$21,042	$27,122
35	**TOTAL COST**					$36,479			$126,251	$162,729

E M C ENGINEERS, INC.

DATE: Feb-96

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

BY: DMS

CLIENT CONTRACT NO.: DACA 01-94D-0033

JOB: 1406.011

LOCATION: FT LEONARD WOOD, MO.

CHK: AJN

FILE: 730BHL

BUILDING HEATING LOAD CALCULATION SHEET

BLDG NO: 730 BLDG NAME: BARRACKS WITHOUT AC

BLDG FUNCTION:

FLOOR AREA: (SQ. FT) 40,986 # FLOORS 3

SLAB PERIMETER: (FT) 514

I. AREAS: ([ ] FIELD VERIFIED ELEVATION PLANS)

		NORTH	SOUTH	EAST	WEST	TOTAL
WALLS, GROSS	(SQ. FT)	9,088	9,088	1,845	1,845	21,866
GLASS	(SQ. FT)	467	435	17	19	938
PERSONNEL DOOR	(SQ. FT)	80	40	0	0	120
INSULATED PANEL	(SQ. FT)	233	217	9	9	468
WALLS, NET	(SQ. FT)	8,308	8,396	1,819	1,817	20,341
ROOF AREA (OR CEILING AREA IF ATTIC IS UNCONDITIONED)					(SQ. FT)	13,662
INSULATED PANEL	(SQ. FT)	468	PERSONNEL DOOR		(SQ. FT)	120
BASEMENT WALLS	(SQ. FT)	0	0	0	0	0

II. CONSTRUCTION: ([ ] FIELD VERIFIED WALL, ROOF, WINDOW, DOOR TYPES)

WALLS: (SKETCH CROSS SECTION OF WALL)	COMPONENTS	R-VALUE
	1. OUTSIDE AIR FILM	0.17
	2. 4" FACE BRICK	0.43
	3. AIR SPACE	0.91
	4. 4"CMU / 9" L.W. CONC.	3.00
	5.	
	6.	
	7. INSIDE AIR FILM	0.68
	TOTAL R-WALL =	5.19
	U=1/R	0.193

ROOF: (SKETCH CROSS SECTION OF ROOF)	COMPONENTS	R-VALUE
	1. OUTSIDE AIR FILM	0.17
	2. BUILT UP ROOF	0.34
	3. 2" INSULATION	8.00
	4. 7" L.W. CONCRETE	6.25
	5.	
	6.	
	7. INSIDE AIR FILM	0.68
	TOTAL R-ROOF =	15.44
	U=1/R	0.065

GLASS TYPE:	PPG 'PENNVERNON' C.L. TWNDV, SSA, .88 S.C.	R-GLASS	1.61
SLAB TYPE FLOOR:	CEMENT	SLF	0.83
BASEMENT TYPE:	NONE	R-BASEM.	0.00
INSULATED PANEL:		R-PANEL	4.20
PERSONNEL DOOR TYPE:	METAL	R-PDOOR	2.56

III. INFILTRATION:

TIGHT WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.042	=	0
AVG. WALL H/M/L (SQ.FT.)	H	21866	X CFM / SQ.FT.	0.138	=	3,018
LEAKY WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
DOOR OPENINGS / HR - SINGLE DOOR		50	X CFM /OPENING /HR	1.600	=	80
DOOR OPENINGS / HR - DOUBLE DOORS		50	X CFM /OPENING /HR	1.385	=	69
			TOTAL INFILTRATION (CFM)		=	3167

UA PANEL	PANEL AREA	468	X PANEL "U"	0.238	=	111
UA PDOOR	PDOOR AREA	120	X DOOR "U"	0.391	=	47
UA WALL	WALL AREA	19,873	X WALL "U"	0.193	=	3,917
UA ROOF	ROOF AREA	13,662	X ROOF "U"	0.065	=	885
UA GLASS	GLASS AREA	938	X GLASS "U"	0.621	=	582
UA SLAB	SLAB PERIM.	514	X SLF	0.830	=	427
UA BASEM.	B-WALL AREA	0	X BASE. "U"	0.000	=	0
INFILTRATION	CFM	3167	X A. T. F.	1.035	=	3,278
			TOTAL UA (BTU/HR°F)			9,247

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 730ZN1
BLDG: 730 ZONE: 1

Rates of Heat Gain from Occupants of Conditioned Spaces

Zone No.	No. of People	Activity Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)
1	125	4	Seated, light work, typing	Offices, hotels, a	250	200	31,250	25,000
TOT	125					TOTAL	31,250	25,000

Peak Wattage Value for Lights

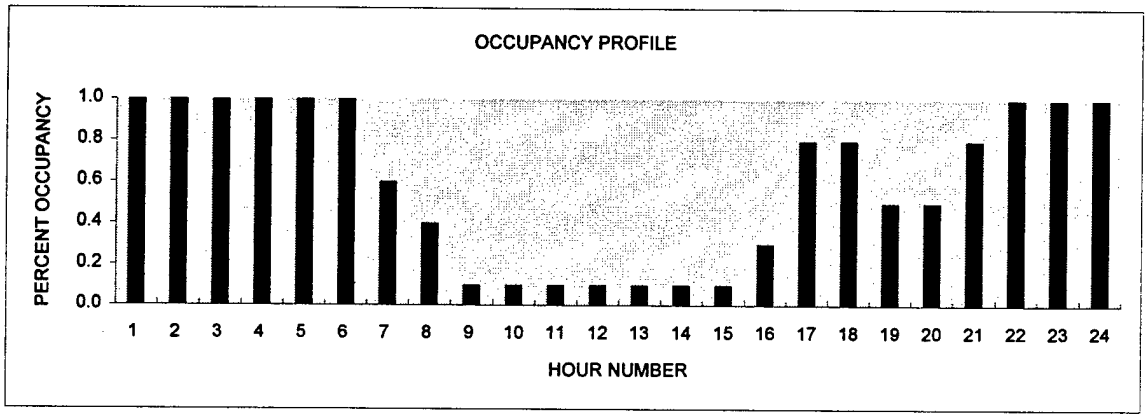
Zone No.	No. of Fixtures	Fixture Type	Description	Watts/Fixture	Total Wattage
1	18	5	Fluorescent, 1 - 34w lamp, 16w ballast (1x4 ft. fixture)	50	900
	76	6	Fluorescent, 2 - 34w lamps, 16w ballast (2x4 ft. fixture)	84	6,384
	64	8	Fluorescent, 4 - 34w lamps, 2 - 16w ballasts (2x4 ft. fix.)	168	10,752
	102	18	Incandescent - 60w	60	6,120
TOT	260			TOTAL	24,156

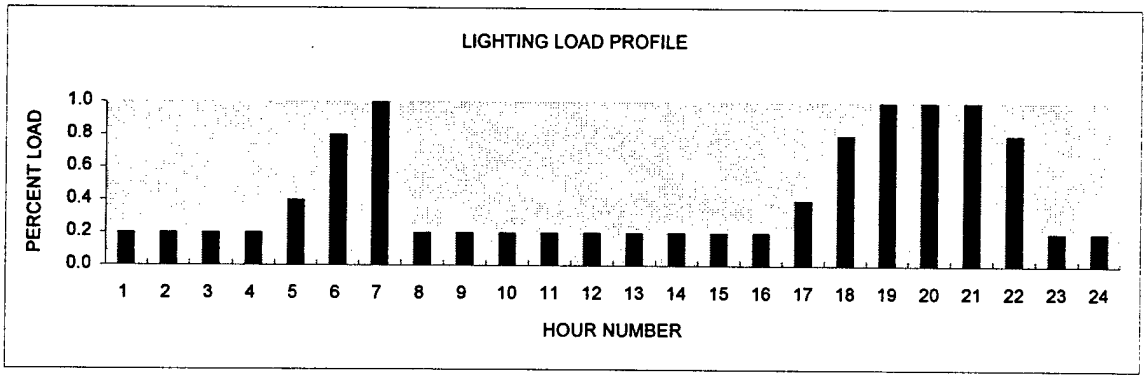
Peak Value for Internal Gains

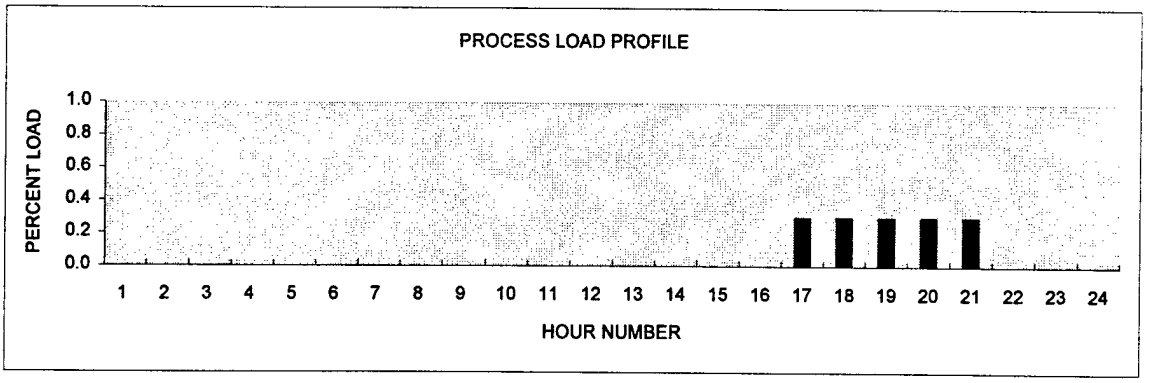
Zone No.	No. of Equipment	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	otal Wattag	Total (BTU)
1	6	68	Washing Machine (Automatic)	512	20%	3,072	10,485
	6	23	Clothes Dryer	4,856	45%	29,136	99,441
				TOTAL	43%	32,208	109,926

V:\1406.011\COLECTD\FIELD\PLE\730Z1.XLS

BLDG TYPE	BLDG FUNCTION	TYPE OF PROFILE	HOUR NUMBER																							
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	Barracks	OCCUPANC	1.0	1.0	1.0	1.0	1.0	1.0	0.6	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.8	0.8	0.5	0.5	0.8	1.0	1.0	1.0
		LIGHTING	0.2	0.2	0.2	0.2	0.4	0.8	1.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.8	1.0	1.0	1.0	0.8	0.2	0.2
		PROCESS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0







BLDG 730 - BARRACKS WITHOUT A/C BASELINE
---------- PROGRAM CONTROL OPTIONS ----------
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 0
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0
--------- SITE AND BUILDING DATA --------------
******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 0.000000E+00
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 437184.000000
FLOOR AREA (SQFT) 40986.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 1664120.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 409860.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 3167.000000
INFILTRATION PROFILE

.670	.670	.670	.670	.670	.670	.670	.670
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.670	.670	.670	.670	.670	.670

A FACTOR IN INFILTRATION EQUATION (CINA) 4.350000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 231200.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 0.000000E+00
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 47.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	8613.0	1828.0	8541.0	1826.0
WINDOW AREA SQFT (AWND)	435.0	18.5	467.0	17.2
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	43.5	1.9	46.7	1.7
WIDTH OF OVERHANG (WOH)	2.5	2.5	2.5	2.5
OVERHANG HGT ABV WNDW(HOH)	1.0	1.0	1.0	1.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.194	.193	.194	.194
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01454	.01447	.01454	.01454
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00002	.00002	.00002	.00002
N=2	.00224	.00223	.00224	.00224
N=3	.00805	.00801	.00805	.00805
N=4	.00394	.00392	.00394	.00394
N=5	.00029	.00029	.00029	.00029
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	-.07415	-.07415	-.07415	-.07415
N=5	.00212	.00212	.00212	.00212
N=6	********	********	********	********

ROOF AREA SQFT (AROF) 13662.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 6.500000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.078409E-03
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .111E-03 .561E-03 .369E-03 .369E-04 738.
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.46 .533 -.611E-01 .820E-03 999.
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.300000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	24.	47268.	31250.	25000.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.200	.000	1.000	1.000	72.0	.0
2	.200	.000	1.000	1.000	72.0	.0
3	.200	.000	1.000	1.000	72.0	.0
4	.200	.000	1.000	1.000	72.0	.0
5	.400	.000	1.000	1.000	72.0	.0
6	.800	.000	1.000	1.000	72.0	.0
7	1.000	.000	.600	.600	72.0	.0
8	.200	.000	.400	.400	72.0	.0

```
  9         .200      .000      .100      .100        72.0         .0
 10         .200      .000      .100      .100        72.0         .0
 11         .200      .000      .100      .100        72.0         .0
 12         .200      .000      .100      .100        72.0         .0
 13         .200      .000      .100      .100        72.0         .0
 14         .200      .000      .100      .100        72.0         .0
 15         .200      .000      .100      .100        72.0         .0
 16         .200      .000      .300      .300        72.0         .0
 17         .400      .300      .800      .800        72.0         .0
 18         .800      .300      .800      .800        72.0         .0
 19        1.000      .300      .500      .500        72.0         .0
 20        1.000      .300      .500      .500        72.0         .0
 21        1.000      .300      .800      .800        72.0         .0
 22         .800      .000     1.000     1.000        72.0         .0
 23         .200      .000     1.000     1.000        72.0         .0
 24         .200      .000     1.000     1.000        72.0         .0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)      100.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)    0.000000E+00
ECONOMIZER HIGH TEMP LIMIT F     0.000000E+00
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR     0.000000E+00
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     0.000000E+00
FAN EFFICIENCY (EFAN)     1.000000E-05
FAN TOTAL PRESSURE IN. WATER  (DP)     0.000000E+00
HEATING PLANT RATED OUTPUT BTU (HFLOT) 1700000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)  2125000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100       .191       .200       .286       .300       .369       .400       .451
 .500       .537       .600       .625       .700       .718       .800       .812
 .900       .906       1.00       1.00
CHILLER TYPE (ITYPCH)            0
COOLING PLANT RATED OUTPUT BTU (CFLOT)     1.000000E-10
COOLING PLANT RATED INPUT BTU (CFLIN)     0.000000E+00
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 10.0       16.0       20.0       22.0       30.0       28.5       40.0       34.5
 50.0       42.5       60.0       50.0       70.0       60.0       80.0       71.5
 90.0       85.0       100.       100.
```

BLDG 730 - BARRACKS WITHOUT A/C BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	14.	0.	0.	0.	0.	0.	0.	0.
	-401.	LOSS		-26.	-1.	0.	-89.	-14.	-326.	0.
FEB	0.	GAIN	16.	0.	0.	0.	0.	0.	0.	0.
	-324.	LOSS		-23.	-1.	0.	-68.	-12.	-276.	0.
MAR	0.	GAIN	21.	0.	0.	0.	4.	0.	0.	0.
	-264.	LOSS		-20.	-1.	0.	-55.	-11.	-245.	0.
APR	0.	GAIN	20.	0.	0.	0.	11.	0.	2.	0.
	-111.	LOSS		-12.	-1.	0.	-28.	-6.	-135.	0.
MAY	.00	GAIN	22.56	.00	.01	.00	17.67	.10	1.73	.00
	-18.40	LOSS		-6.45	-.42	.00	-14.67	-4.29	-76.02	.00
JUN	.00	GAIN	23.02	.00	.00	.00	19.43	.05	.90	.00
	.00	LOSS		-5.00	-.36	.00	-11.30	-3.66	-62.60	.00
JUL	.00	GAIN	23.12	.00	.01	.00	19.95	.13	2.27	.00
	.00	LOSS		-4.96	-.37	.00	-11.93	-3.79	-66.15	.00
AUG	.00	GAIN	20.49	.00	.01	.00	17.39	.14	2.51	.00
	.00	LOSS		-5.22	-.36	.00	-12.39	-3.69	-62.64	.00
SEP	.00	GAIN	17.38	.00	.01	.00	13.80	.14	2.63	.00
	-23.50	LOSS		-7.05	-.39	.00	-15.50	-4.05	-74.72	.00
OCT	0.	GAIN	16.	0.	0.	0.	6.	0.	2.	0.
	-100.	LOSS		-12.	-1.	0.	-30.	-6.	-117.	0.
NOV	0.	GAIN	13.	0.	0.	0.	2.	0.	0.	0.
	-205.	LOSS		-18.	-1.	0.	-52.	-9.	-182.	0.
DEC	0.	GAIN	12.	0.	0.	0.	0.	0.	0.	0.
	-387.	LOSS		-27.	-1.	0.	-90.	-13.	-310.	0.
TOT	0.	GAIN	218.	0.	0.	0.	112.	1.	14.	0.
	-1834.	LOSS		-166.	-9.	0.	-478.	-90.	-1934.	0.

MAX HEATING LOAD= -1235978. BTUH ON DEC 18 HOUR 2 AMBIENT TEMP 3.
MAX COOLING LOAD= 0. BTUH ON DEC 31 HOUR 24 AMBIENT TEMP 42.

ZONE UA BTU/HR-F 5551.3

BLDG 730 - BARRACKS WITHOUT A/C BASELINE

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	72.	72.		4	21	57.	7.64	5.11	.00	42.22
			71.	1	1	42.				
FEB	72.	72.		26	19	51.	6.90	4.62	.00	38.14
			71.	2	4	14.				
MAR	72.	77.		28	21	63.	7.64	5.11	.00	42.22
			71.	4	5	15.				
APR	73.	83.		30	22	67.	7.39	4.95	.00	40.86
			72.	9	4	31.				
MAY	77.	88.		29	22	68.	7.64	5.11	.00	42.22
			72.	11	4	38.				
JUN	83.	93.		29	22	75.	7.39	4.95	.00	40.86
			75.	17	9	70.				
JUL	87.	97.		15	22	83.	7.64	5.11	.00	42.22
			75.	24	9	68.				
AUG	86.	93.		29	21	76.	7.64	5.11	.00	42.22
			74.	26	8	66.				
SEP	79.	93.		2	21	80.	7.39	4.95	.00	40.86
			72.	18	9	66.				
OCT	74.	84.		4	22	69.	7.64	5.11	.00	42.22
			72.	13	12	68.				
NOV	72.	77.		8	22	67.	7.39	4.95	.00	40.86
			71.	14	16	67.				
DEC	72.	72.		23	21	52.	7.64	5.11	.00	42.22
			71.	18	8	1.				
YEAR							89.95	60.18	.00	497.12

BLDG 730 - BARRACKS WITHOUT A/C BASELINE

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	744	0	0	0	-.1161E+07	.0000
FEB	668	0	0	0	-.1015E+07	.0000
MAR	654	0	0	0	-.1061E+07	.0000
APR	399	0	0	0	-.5996E+06	.0000
MAY	125	0	0	0	-.3697E+06	.0000
JUN	0	0	0	0	.0000	.0000
JUL	0	0	0	0	.0000	.0000
AUG	0	0	0	0	.0000	.0000
SEP	149	0	0	0	-.3277E+06	.0000
OCT	437	0	0	0	-.5227E+06	.0000
NOV	614	0	0	0	-.7663E+06	.0000
DEC	740	0	0	0	-.1236E+07	.0000
YEAR	4530	0	0	0	-.1236E+07	.0000

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	606.86	.00	7.64	5.11	.00	42.22	24.2
FEB	507.40	.00	6.90	4.62	.00	38.14	24.2
MAR	441.89	.00	7.64	5.11	.00	42.22	24.2
APR	218.10	.00	7.39	4.95	.00	40.86	24.2
MAY	54.74	.00	7.64	5.11	.00	42.22	24.2
JUN	.00	.00	7.39	4.95	.00	40.86	24.2
JUL	.00	.00	7.64	5.11	.00	42.22	24.2
AUG	.00	.00	7.64	5.11	.00	42.22	24.2
SEP	65.51	.00	7.39	4.95	.00	40.86	24.2
OCT	216.11	.00	7.64	5.11	.00	42.22	24.2
NOV	372.66	.00	7.39	4.95	.00	40.86	24.2
DEC	590.81	.00	7.64	5.11	.00	42.22	24.2
YEAR	3074.08	.00	89.95	60.18	.00	497.12	24.2

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 83962. BTU/(SQFT-YEAR)

BLDG 730 - BARRACKS WITHOUT A/C BASELINE

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	-	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.1161E+07
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.1015E+07
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.0000	-.1061E+07
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.0000	-.5996E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.0000	-.3697E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	-.3277E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.0000	-.5227E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.0000	-.7663E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.1236E+07

BLDG 730 - BARRACKS WITHOUT A/C - ECO-1 INSTALL 3.5" FIBERGLASS INSUL.

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 0
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA --------------

******REAL WEATHER FROM DISK*******

FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 0.000000E+00
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 437184.000000
FLOOR AREA (SQFT) 40986.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 1664120.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 409860.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 3167.000000
INFILTRATION PROFILE

.670	.670	.670	.670	.670	.670	.670	.670
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.670	.670	.670	.670	.670	.670

A FACTOR IN INFILTRATION EQUATION (CINA) 4.350000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 231200.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 0.000000E+00
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 47.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	8613.0	1828.0	8541.0	1826.0
WINDOW AREA SQFT (AWND)	435.0	18.5	467.0	17.2
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	43.5	1.9	46.7	1.7
WIDTH OF OVERHANG (WOH)	2.5	2.5	2.5	2.5
OVERHANG HGT ABV WNDW(HOH)	1.0	1.0	1.0	1.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.060	.060	.060	.060
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00165	.00165	.00165	.00165
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00015	.00015	.00015	.00015
N=3	.00081	.00081	.00081	.00081
N=4	.00062	.00062	.00062	.00062
N=5	.00008	.00008	.00008	.00008
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	-.16643	-.16643	-.16643	-.16643
N=5	.00728	.00728	.00728	.00728
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 13662.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 6.500000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.078409E-03
ROOF B TRANSFER FUNCTIONS (BNR)

.000	.111E-03	.561E-03	.369E-03	.369E-04	738.

ROOF D TRANSFER FUNCTIONS (DNR)

1.00	-1.46	.533	-.611E-01	.820E-03	999.

SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.300000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	BTU/HR			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	24.	47268.	31250.	25000.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.200	.000	1.000	1.000	72.0	.0
2	.200	.000	1.000	1.000	72.0	.0
3	.200	.000	1.000	1.000	72.0	.0
4	.200	.000	1.000	1.000	72.0	.0
5	.400	.000	1.000	1.000	72.0	.0
6	.800	.000	1.000	1.000	72.0	.0
7	1.000	.000	.600	.600	72.0	.0
8	.200	.000	.400	.400	72.0	.0

```
  9         .200      .000      .100      .100        72.0         .0
 10         .200      .000      .100      .100        72.0         .0
 11         .200      .000      .100      .100        72.0         .0
 12         .200      .000      .100      .100        72.0         .0
 13         .200      .000      .100      .100        72.0         .0
 14         .200      .000      .100      .100        72.0         .0
 15         .200      .000      .100      .100        72.0         .0
 16         .200      .000      .300      .300        72.0         .0
 17         .400      .300      .800      .800        72.0         .0
 18         .800      .300      .800      .800        72.0         .0
 19        1.000      .300      .500      .500        72.0         .0
 20        1.000      .300      .500      .500        72.0         .0
 21        1.000      .300      .800      .800        72.0         .0
 22         .800      .000     1.000     1.000        72.0         .0
 23         .200      .000     1.000     1.000        72.0         .0
 24         .200      .000     1.000     1.000        72.0         .0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)      100.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)    0.000000E+00
ECONOMIZER HIGH TEMP LIMIT F     0.000000E+00
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR     0.000000E+00
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     0.000000E+00
FAN EFFICIENCY (EFAN)     1.000000E-05
FAN TOTAL PRESSURE IN. WATER  (DP)     0.000000E+00
HEATING PLANT RATED OUTPUT BTU (HFLOT) 1700000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)  2125000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)            0
COOLING PLANT RATED OUTPUT BTU (CFLOT)     1.000000E-10
COOLING PLANT RATED INPUT BTU (CFLIN)     0.000000E+00
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 10.0      16.0      20.0      22.0      30.0      28.5      40.0      34.5
 50.0      42.5      60.0      50.0      70.0      60.0      80.0      71.5
 90.0      85.0      100.      100.
```

BLDG 730 - BARRACKS WITHOUT A/C - ECO-1 INSTALL 3.5" FIBERGLASS INSUL.

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	14.	0.	0.	0.	0.	0.	0.	0.
	-339.	LOSS		-26.	-1.	0.	-27.	-14.	-326.	0.
FEB	0.	GAIN	16.	0.	0.	0.	0.	0.	0.	0.
	-278.	LOSS		-23.	-1.	0.	-21.	-12.	-276.	0.
MAR	0.	GAIN	21.	0.	0.	0.	0.	0.	0.	0.
	-228.	LOSS		-20.	-1.	0.	-16.	-11.	-244.	0.
APR	0.	GAIN	20.	0.	0.	0.	2.	0.	2.	0.
	-96.	LOSS		-12.	-1.	0.	-7.	-6.	-133.	0.
MAY	.00	GAIN	22.56	.00	.01	.00	3.32	.10	1.72	.00
	-15.16	LOSS		-6.04	-.40	.00	-1.78	-4.06	-71.82	.00
JUN	.00	GAIN	23.02	.00	.00	.00	3.90	.05	.80	.00
	.00	LOSS		-4.58	-.34	.00	-.76	-3.43	-58.10	.00
JUL	.00	GAIN	23.12	.00	.01	.00	3.94	.12	2.25	.00
	.00	LOSS		-4.56	-.35	.00	-.96	-3.57	-61.92	.00
AUG	.00	GAIN	20.49	.00	.01	.00	3.16	.13	2.37	.00
	.00	LOSS		-4.94	-.35	.00	-1.16	-3.53	-59.66	.00
SEP	.00	GAIN	17.38	.00	.01	.00	2.24	.12	2.41	.00
	-19.50	LOSS		-6.83	-.38	.00	-2.37	-3.92	-72.20	.00
OCT	0.	GAIN	16.	0.	0.	0.	1.	0.	2.	0.
	-83.	LOSS		-12.	-1.	0.	-8.	-6.	-116.	0.
NOV	0.	GAIN	13.	0.	0.	0.	0.	0.	0.	0.
	-170.	LOSS		-18.	-1.	0.	-15.	-9.	-182.	0.
DEC	0.	GAIN	12.	0.	0.	0.	0.	0.	0.	0.
	-326.	LOSS		-27.	-1.	0.	-28.	-13.	-311.	0.
TOT	0.	GAIN	218.	0.	0.	0.	19.	1.	13.	0.
	-1554.	LOSS		-164.	-9.	0.	-129.	-89.	-1912.	0.

MAX HEATING LOAD= -1065214. BTUH ON DEC 18 HOUR 2 AMBIENT TEMP 3.
MAX COOLING LOAD= 0. BTUH ON DEC 31 HOUR 24 AMBIENT TEMP 42.

ZONE UA BTU/HR-F 2764.9

BLDG 730 - BARRACKS WITHOUT A/C - ECO-1 INSTALL 3.5" FIBERGLASS INSUL.

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	COINCIDENT DAY	HR	AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL INTERNAL HEAT GAIN MILLION BTU
JAN	72.	72.		4	21	57.	7.64	5.11	.00	42.22
			71.	1	1	42.				
FEB	72.	72.		17	13	59.	6.90	4.62	.00	38.14
			72.	2	3	15.				
MAR	72.	75.		28	21	63.	7.64	5.11	.00	42.22
			72.	3	4	17.				
APR	73.	80.		30	21	71.	7.39	4.95	.00	40.86
			72.	1	2	34.				
MAY	76.	86.		29	21	70.	7.64	5.11	.00	42.22
			72.	11	4	38.				
JUN	82.	91.		29	21	76.	7.39	4.95	.00	40.86
			75.	17	7	61.				
JUL	87.	95.		16	21	80.	7.64	5.11	.00	42.22
			76.	24	5	65.				
AUG	85.	92.		29	20	79.	7.64	5.11	.00	42.22
			74.	26	8	66.				
SEP	79.	91.		2	21	80.	7.39	4.95	.00	40.86
			72.	15	4	41.				
OCT	73.	83.		5	21	69.	7.64	5.11	.00	42.22
			72.	29	16	67.				
NOV	72.	76.		8	22	67.	7.39	4.95	.00	40.86
			72.	6	16	67.				
DEC	72.	72.		23	14	70.	7.64	5.11	.00	42.22
			72.	18	4	1.				
YEAR							89.95	60.18	.00	497.12

BLDG 730 - BARRACKS WITHOUT A/C - ECO-1 INSTALL 3.5" FIBERGLASS INSUL.

	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED		NUMBER OF HOURS WHEN LOADS WERE NOT MET		MAXIMUM LOADS BTU	
MONTH	HEATING	COOLING INCLUDING ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	744	0	0	0	-.1004E+07	.0000
FEB	669	0	0	0	-.8813E+06	.0000
MAR	675	0	0	0	-.9128E+06	.0000
APR	417	0	0	0	-.4861E+06	.0000
MAY	127	0	0	0	-.3038E+06	.0000
JUN	0	0	0	0	.0000	.0000
JUL	0	0	0	0	.0000	.0000
AUG	0	0	0	0	.0000	.0000
SEP	155	0	0	0	-.2708E+06	.0000
OCT	450	0	0	0	-.4446E+06	.0000
NOV	622	0	0	0	-.6366E+06	.0000
DEC	740	0	0	0	-.1065E+07	.0000
YEAR	4599	0	0	0	-.1065E+07	.0000

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	543.39	.00	7.64	5.11	.00	42.22	24.2
FEB	459.03	.00	6.90	4.62	.00	38.14	24.2
MAR	411.32	.00	7.64	5.11	.00	42.22	24.2
APR	208.22	.00	7.39	4.95	.00	40.86	24.2
MAY	53.77	.00	7.64	5.11	.00	42.22	24.2
JUN	.00	.00	7.39	4.95	.00	40.86	24.2
JUL	.00	.00	7.64	5.11	.00	42.22	24.2
AUG	.00	.00	7.64	5.11	.00	42.22	24.2
SEP	65.04	.00	7.39	4.95	.00	40.86	24.2
OCT	204.29	.00	7.64	5.11	.00	42.22	24.2
NOV	341.81	.00	7.39	4.95	.00	40.86	24.2
DEC	525.46	.00	7.64	5.11	.00	42.22	24.2
YEAR	2812.35	.00	89.95	60.18	.00	497.12	24.2

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 77576. BTU/(SQFT-YEAR)

BLDG 730 - BARRACKS WITHOUT A/C - ECO-1 INSTALL 3.5" FIBERGLASS INSUL.

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM NOT MET COOL	HOURS WHEN SYSTEM NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.1004E+07
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.8813E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.0000	-.9128E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.0000	-.4861E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.0000	-.3038E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	-.2708E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.0000	-.4446E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.0000	-.6366E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.1065E+07

BLDG 730 - BARRACKS WITHOUT A/C - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 0
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 0.000000E+00
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 437184.000000
FLOOR AREA (SQFT) 40986.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 1664120.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 409860.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 3167.000000
INFILTRATION PROFILE

.670	.670	.670	.670	.670	.670	.670	.670
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.670	.670	.670	.670	.670	.670

A FACTOR IN INFILTRATION EQUATION (CINA) 4.350000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 231200.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 0.000000E+00
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 47.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	8613.0	1828.0	8541.0	1826.0
WINDOW AREA SQFT (AWND)	435.0	18.5	467.0	17.2
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	43.5	1.9	46.7	1.7
WIDTH OF OVERHANG (WOH)	2.5	2.5	2.5	2.5
OVERHANG HGT ABV WNDW(HOH)	1.0	1.0	1.0	1.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.052	.052	.052	.052
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00165	.00165	.00165	.00165
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00018	.00018	.00018	.00018
N=3	.00084	.00084	.00084	.00084
N=4	.00056	.00056	.00056	.00056
N=5	.00006	.00006	.00006	.00006
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	-.14508	-.14508	-.14508	-.14508
N=5	.00613	.00613	.00613	.00613
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 13662.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 6.500000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 1.078409E-03
ROOF B TRANSFER FUNCTIONS (BNR)

.000	.111E-03	.561E-03	.369E-03	.369E-04	738.

ROOF D TRANSFER FUNCTIONS (DNR)

1.00	-1.46	.533	-.611E-01	.820E-03	999.

SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.300000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	24.	47268.	31250.	25000.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.200	.000	1.000	1.000	72.0	.0
2	.200	.000	1.000	1.000	72.0	.0
3	.200	.000	1.000	1.000	72.0	.0
4	.200	.000	1.000	1.000	72.0	.0
5	.400	.000	1.000	1.000	72.0	.0
6	.800	.000	1.000	1.000	72.0	.0
7	1.000	.000	.600	.600	72.0	.0
8	.200	.000	.400	.400	72.0	.0

```
   9          .200       .000       .100       .100          72.0          .0
  10          .200       .000       .100       .100          72.0          .0
  11          .200       .000       .100       .100          72.0          .0
  12          .200       .000       .100       .100          72.0          .0
  13          .200       .000       .100       .100          72.0          .0
  14          .200       .000       .100       .100          72.0          .0
  15          .200       .000       .100       .100          72.0          .0
  16          .200       .000       .300       .300          72.0          .0
  17          .400       .300       .800       .800          72.0          .0
  18          .800       .300       .800       .800          72.0          .0
  19         1.000       .300       .500       .500          72.0          .0
  20         1.000       .300       .500       .500          72.0          .0
  21         1.000       .300       .800       .800          72.0          .0
  22          .800       .000      1.000      1.000          72.0          .0
  23          .200       .000      1.000      1.000          72.0          .0
  24          .200       .000      1.000      1.000          72.0          .0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)      100.000000
SYSTEM TYPE, (IECN)            2
SUPPLY AIR CFM (SACFM)    0.000000E+00
ECONOMIZER HIGH TEMP LIMIT F     0.000000E+00
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR     0.000000E+00
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     0.000000E+00
FAN EFFICIENCY (EFAN)     1.000000E-05
FAN TOTAL PRESSURE IN. WATER  (DP)     0.000000E+00
HEATING PLANT RATED OUTPUT BTU (HFLOT) 1700000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)  2125000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100       .191       .200       .286       .300       .369       .400       .451
 .500       .537       .600       .625       .700       .718       .800       .812
 .900       .906       1.00       1.00
CHILLER TYPE (ITYPCH)             0
COOLING PLANT RATED OUTPUT BTU (CFLOT)     1.000000E-10
COOLING PLANT RATED INPUT BTU (CFLIN)     0.000000E+00
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 10.0       16.0       20.0       22.0       30.0       28.5       40.0       34.5
 50.0       42.5       60.0       50.0       70.0       60.0       80.0       71.5
 90.0       85.0       100.       100.
```

BLDG 730 - BARRACKS WITHOUT A/C - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	0.	GAIN	14.	0.	0.	0.	0.	0.	0.	0.
	-335.	LOSS		-26.	-1.	0.	-24.	-14.	-326.	0.
FEB	0.	GAIN	16.	0.	0.	0.	0.	0.	0.	0.
	-275.	LOSS		-23.	-1.	0.	-18.	-12.	-276.	0.
MAR	0.	GAIN	21.	0.	0.	0.	0.	0.	0.	0.
	-226.	LOSS		-20.	-1.	0.	-14.	-11.	-245.	0.
APR	0.	GAIN	20.	0.	0.	0.	2.	0.	2.	0.
	-95.	LOSS		-12.	-1.	0.	-6.	-6.	-133.	0.
MAY	.00	GAIN	22.56	.00	.01	.00	3.03	.10	1.75	.00
	-15.07	LOSS		-6.01	-.40	.00	-1.66	-4.05	-71.61	.00
JUN	.00	GAIN	23.02	.00	.00	.00	3.53	.05	.82	.00
	.00	LOSS		-4.55	-.34	.00	-.77	-3.41	-57.80	.00
JUL	.00	GAIN	23.12	.00	.01	.00	3.57	.13	2.28	.00
	.00	LOSS		-4.53	-.35	.00	-.95	-3.56	-61.64	.00
AUG	.00	GAIN	20.49	.00	.01	.00	2.88	.13	2.39	.00
	.00	LOSS		-4.91	-.35	.00	-1.13	-3.52	-59.46	.00
SEP	.00	GAIN	17.38	.00	.01	.00	2.06	.12	2.42	.00
	-19.36	LOSS		-6.82	-.38	.00	-2.17	-3.92	-72.10	.00
OCT	0.	GAIN	16.	0.	0.	0.	1.	0.	2.	0.
	-82.	LOSS		-12.	-1.	0.	-7.	-6.	-116.	0.
NOV	0.	GAIN	13.	0.	0.	0.	0.	0.	0.	0.
	-168.	LOSS		-18.	-1.	0.	-13.	-9.	-182.	0.
DEC	0.	GAIN	12.	0.	0.	0.	0.	0.	0.	0.
	-322.	LOSS		-27.	-1.	0.	-24.	-13.	-311.	0.
TOT	0.	GAIN	218.	0.	0.	0.	18.	1.	13.	0.
	-1538.	LOSS		-163.	-9.	0.	-113.	-89.	-1911.	0.

MAX HEATING LOAD= -1058637. BTUH ON DEC 18 HOUR 2 AMBIENT TEMP 3.
MAX COOLING LOAD= 0. BTUH ON DEC 31 HOUR 24 AMBIENT TEMP 42.

ZONE UA BTU/HR-F 2598.4

BLDG 730 - BARRACKS WITHOUT A/C - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL INTERNAL HEAT GAIN MILLION BTU
JAN	72.	72.		4	21	57.	7.64	5.11	.00	42.22
			71.	1	1	42.				
FEB	72.	72.		17	13	59.	6.90	4.62	.00	38.14
			72.	2	3	15.				
MAR	72.	75.		28	21	63.	7.64	5.11	.00	42.22
			72.	3	4	17.				
APR	73.	80.		30	21	71.	7.39	4.95	.00	40.86
			72.	1	2	34.				
MAY	76.	86.		29	21	70.	7.64	5.11	.00	42.22
			72.	11	4	38.				
JUN	82.	91.		29	21	76.	7.39	4.95	.00	40.86
			75.	18	6	59.				
JUL	87.	95.		16	21	80.	7.64	5.11	.00	42.22
			76.	24	5	65.				
AUG	85.	91.		29	20	79.	7.64	5.11	.00	42.22
			74.	26	8	66.				
SEP	79.	91.		2	21	80.	7.39	4.95	.00	40.86
			72.	15	4	41.				
OCT	73.	83.		5	21	69.	7.64	5.11	.00	42.22
			72.	28	4	30.				
NOV	72.	76.		8	22	67.	7.39	4.95	.00	40.86
			72.	6	16	67.				
DEC	72.	72.		23	14	70.	7.64	5.11	.00	42.22
			72.	18	4	1.				
YEAR							89.95	60.18	.00	497.12

BLDG 730 - BARRACKS WITHOUT A/C - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	744	0	0	0	-.9986E+06	.0000
FEB	669	0	0	0	-.8767E+06	.0000
MAR	673	0	0	0	-.9075E+06	.0000
APR	417	0	0	0	-.4843E+06	.0000
MAY	127	0	0	0	-.3032E+06	.0000
JUN	0	0	0	0	.0000	.0000
JUL	0	0	0	0	.0000	.0000
AUG	0	0	0	0	.0000	.0000
SEP	155	0	0	0	-.2699E+06	.0000
OCT	450	0	0	0	-.4422E+06	.0000
NOV	619	0	0	0	-.6314E+06	.0000
DEC	740	0	0	0	-.1059E+07	.0000
YEAR	4594	0	0	0	-.1059E+07	.0000

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
MONTH	HEATING MILLION BTU	COOLING THOUSAND KWH	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FANS THOUSAND KWH	HEAT GAIN MILLION BTU	ELECTRIC DEMAND KW
JAN	539.73	.00	7.64	5.11	.00	42.22	24.2
FEB	456.30	.00	6.90	4.62	.00	38.14	24.2
MAR	408.60	.00	7.64	5.11	.00	42.22	24.2
APR	207.49	.00	7.39	4.95	.00	40.86	24.2
MAY	53.75	.00	7.64	5.11	.00	42.22	24.2
JUN	.00	.00	7.39	4.95	.00	40.86	24.2
JUL	.00	.00	7.64	5.11	.00	42.22	24.2
AUG	.00	.00	7.64	5.11	.00	42.22	24.2
SEP	65.00	.00	7.39	4.95	.00	40.86	24.2
OCT	203.75	.00	7.64	5.11	.00	42.22	24.2
NOV	338.92	.00	7.39	4.95	.00	40.86	24.2
DEC	521.64	.00	7.64	5.11	.00	42.22	24.2
YEAR	2795.18	.00	89.95	60.18	.00	497.12	24.2

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 77157. BTU/(SQFT-YEAR)

BLDG 730 - BARRACKS WITHOUT A/C - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.9986E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.8767E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.0000	-.9075E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.0000	-.4843E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.0000	-.3032E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	-.2699E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.0000	-.4422E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.0000	-.6314E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.1059E+07

BUILDING MANAGER INTERVIEW

BUILDING INFORMATION:							
Building No:	730	Building Name:	Barracks without A/C				
Surveyed by:	DMS	Date:	11/9/95	Building Use:	Living Quarters		
Building Contact:				Phone No:			
Building Contact:				Phone No:			
OCCUPANCY:							
Number of Occupants:	Mon./Fri.:	125	Schedule:	0	To	2400	
	Tues./Thurs	125		0	To	2400	
	Wed.	125		0	To	2400	
	Sat./Sun.	125		0	To	2400	
Visitors Per Day:	Mon./Fri.:		Schedule:		To		
	Tues./Thurs.				To		
	Wed.				To		
	Sat./Sun.				To		
Comments:							
LIGHTING SCHEDULE:							
Normal Occupancy:	Mon.-Fri.:		Schedule:	500	To	2200	
	Sat./Sun.:			500	To	2200	
Cleaning Crew/2nd Shift:	Mon.-Fri.:		Schedule:		To		
	Sat./Sun.:				To		
EQUIPMENT SCHEDULE:							
Fan/AHU Schedule:	Mon.-Fri.:		Schedule:	0	To	2400	
	Sat./Sun.:			0	To	2400	
Chiller Schedule:	Mon.-Fri.:		Schedule:		To		
	Sat./Sun.:				To		
Boiler Schedule:	Mon.-Fri.:		Schedule:	0	To	2400	
	Sat./Sun.:			0	To	2400	
Aux. Equipment Schedule:							
	Mon.-Fri.:		Schedule:		To		
	Sat./Sun.:				To		
	Mon.-Fri.:		Schedule:		To		
	Sat./Sun.:				To		
Comments:							

Building No 730 **Building Name:** Barracks

BUILDING ENVELOPE

EXTERIOR WALLS

Wall Direction (N, E, W, or S)	Wall Construction No.	Comments
N	XW-1	
E	XW-1	
S	XW-1	
W	XW-1	

LIST OF EXT. WALL CONSTRUCTION TYPES

Wall Construction No.	Description
XW-1	Face Brick & CMU
XW-2	Face Brick, CMU, & Gyp. Board
XW-3	Face Brick, CMU, & Ceramic Tile
XW-4	Face Brick, CMU, & Plaster Coat
XW-5	Insulated Metal Panel

WINDOWS

Window Direction (N, E, W, or S)	Window Construction No.	Comments
N	W-1	
E	W-1	
S	W-1	
W	W-1	
		GENERAL: Top third of window frame is an insulated
		metal panel.

LIST OF WINDOW TYPES

Window Construction No.	Description
W-1	Double Pane Clear
W-2	Double Pane Tinted
W-3	Single Pane with Storm Windows
W-4	Single Pane

ROOF CONSTRUCTION

Roof Location	Roof Construction No.	Comments
ALL	R-7	

LIST OF ROOF CONSTRUCTION TYPES

Roof Construction No.	Description
R-1	BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile
R-2	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Ceiling Tile
R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Clg
R-4	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plaster Clg.
R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceiling Tile
R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaster Clg.
R-7	BUR, Rigid Insul., 7-1/2" Concrete Slab

Building No 730 **Building Name:** Barracks

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

INTERIOR EQUIPMENT AND OBJECTS				LIST OF EQUIPMENT AND OBJECTS	
Wall Direction (N, E, W, or S)	Item No.	No. of Items	Comments	Item No.	Description
					Architectural
				A-1	Interior Partitions
N	M-3	45		A-2	Wall Placards
N	E-3	9		A-3	Drapery Valances
N	E-2	6		A-4	Drapery Rods
N	A-5	6		A-5	Stainless Steel Shelf in Latrine
N	A-6	6	Glazed structural block 5'-0" A.F.F. in laundry	A-6	Dryer Vents
N	E-1	3			
					Plumbing
E	M-3	6		P-1	Sinks
				P-2	Commodes
S	E-3	6	Glazed structural block 9'-0" A.F.F. in laundry	P-3	Toilet Stalls
S	M-3	45		P-4	Water Fountains
S	P-5	3		P-5	Slop Sink
W	E-2	6			**HVAC Mechanical**
W	M-3	3		M-1	Floor Supply/Return Grilles
				M-2	Ceiling Supply/Return Grilles
				M-3	Finned-Tube Baseboard Radiators
				M-4	Thermostats / Space Temp. Sensors
				M-5	Wall mounted convection type heater
					Electrical
				E-1	Electrical Panels
				E-2	Electrical Outlets
				E-3	Electrical Light Switches
				E-4	Electrican Conduit
				E-5	Emergency light
				E-6	Electrical Disconnect
					Lighting
				L-1	Wall Mounted Fixtures
				L-2	Ceiling Mounted Fixtures
				L-3	Exit Signs
					Fire Protection
				F-1	Alarm Pull Switches
				F-2	Alarm Sound Devices (Speakers, Bells)
				F-3	Sprinkler Heads
				F-4	Fire Extinguishes
					Communication
				C-1	Telephones - Wall Mounted
				C-2	Telephones - Booth Mounted
				C-3	Telephone Jacks

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 730RAD1

BLDG: 730

PERIMETER RADIATION SURVEY OBSERVATIONS

RAD-1	PER RAD NO.	NORTH	LOCATION (RM)
CONV-1	SOURCE OF HEATING	NORTH	SERVES AREA

UNIT TYPE:

	STEAM	X	HW		ELECTRIC				
	OTHER								
	COMMENT:								

NAMEPLATE:

	HW PUMP 1 - HP		MFG.		MODEL
	HW PUMP 2 - HP		MFG.		MODEL
	HW PUMP 3 - HP		MFG.		MODEL
	HW PUMP 4 - HP		MFG.		MODEL
COMMENT:	SEE CONVERTER			50.0%	% AREA HEATING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1						1	1	1

CONTROLS:

		PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
RADIATION CONTROL:		NONE		2-WAY VLV		3-WAY VLV		OTHER	NO CONTROL
SPACE SETPOINT (°F):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
RESET CONTROL (°F):		HW HIGH		HW LOW		OA LOW		OA HIGH	
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE: **730RAD2**

BLDG: **730**

PERIMETER RADIATION SURVEY OBSERVATIONS

RAD-2	PER RAD NO.	**NORTH**	LOCATION (RM)
CONV-2	SOURCE OF HEATING	NORTH	SERVES AREA

UNIT TYPE:

	STEAM	X	HW		ELECTRIC				
	OTHER								
	COMMENT:								

NAMEPLATE:

	HW PUMP 1 - HP		MFG.		MODEL
	HW PUMP 2 - HP		MFG.		MODEL
	HW PUMP 3 - HP		MFG.		MODEL
	HW PUMP 4 - HP		MFG.		MODEL
COMMENT:	SEE CONVERTER			50.0%	% AREA HEATING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1						1	1	1

CONTROLS:

		PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
RADIATION CONTROL:		NONE		2-WAY VLV		3-WAY VLV		OTHER	NO CONTROL
SPACE SETPOINT (°F):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
RESET CONTROL (°F):		HW HIGH		HW LOW		OA LOW		OA HIGH	
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: DMS
CHECKED BY: AJN
BLDG: 730
FILE: 730CV1

BOILER & CONVERTER SURVEY OBSERVATIONS

CV-1	BOILER/CONVERTER NO.	MER	LOCATION (RM)
C. PLANT	SOURCE OF HEATING (PLANT)	ALL	SERVES AREA

UNIT TYPE:

	STEAM		PSIG		HW		TEMP.		BOILER TYPE:
	NO.2 OIL		NO.6 OIL		N.GAS		ELEC		FUELS:
X	STM/HW		HTHW/HW		HTHW/STM		OTHER		CONVERTER TYPE:
X	SPACE HEAT		DHW		OTHER				USE:
COMMENT:							0%	% HTG AREA SERVED	
								BB RADIATION ONLY	

NAMEPLATE:

	MFG.		MODEL	936000	CAPACITY OUTPUT (BTUH)
				936000	CAPACITY INPUT (BTUH)
	MFG.		MODEL		CAPACITY OUTPUT (BTUH)
					CAPACITY INPUT (BTUH)
0.75	HW PUMP 1 - HP	BALDOR	MFG.	JM3463	MODEL
	HW PUMP 2 - HP		MFG.		MODEL
	HW PUMP 3 - HP		MFG.		MODEL
COMMENT:					

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1						1	1	1

CONTROLS:

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		PSIG		HW SUPPLY					
RESET CONTROL (oF):	160	HW HIGH	80	HW LOW	65	OA LOW	0	OA HIGH	
BURNER CONTROLS		O2 TRIM (Y/N)		OTHER					
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE: **730CV2**

BLDG: **730**

BOILER & CONVERTER SURVEY OBSERVATIONS

CV-2	BOILER/CONVERTER NO.	**MER**	LOCATION (RM)
C. PLANT	SOURCE OF HEATING (PLANT)	**ALL**	SERVES AREA

UNIT TYPE:

	STEAM		PSIG		HW		TEMP.		BOILER TYPE:
	NO.2 OIL		NO.6 OIL		N.GAS		ELEC		FUELS:
X	STM/HW		HTHW/HW		HTHW/STM		OTHER		CONVERTER TYPE:
X	SPACE HEAT		DHW		OTHER				USE:
COMMENT:								0%	% HTG AREA SERVED
									BB RADIATION ONLY

NAMEPLATE:

	MFG.		MODEL	936000	CAPACITY OUTPUT (BTUH)
				936000	CAPACITY INPUT (BTUH)
	MFG.		MODEL		CAPACITY OUTPUT (BTUH)
					CAPACITY INPUT (BTUH)
0.75	HW PUMP 1 - HP	**BALDOR**	MFG.	**JM3463**	MODEL
	HW PUMP 2 - HP		MFG.		MODEL
	HW PUMP 3 - HP		MFG.		MODEL
COMMENT:					

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1						1	1	1

CONTROLS:

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		PSIG		HW SUPPLY					
RESET CONTROL (oF):	160	HW HIGH	80	HW LOW	65	OA LOW	0	OA HIGH	
BURNER CONTROLS		O2 TRIM (Y/N)		OTHER					
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
BLDG: **730**
FILE: **730EX1**

AIR HANDLING UNIT SURVEY OBSERVATIONS

EX-1	AHU NO.	**MER**	LOCATION (RM)
NONE	REF. SYS. SERVING AHU	**ALL**	SERVES AREA

UNIT TYPE:

	SINGLE ZN		2-PIPE FC		4-PIPE FC		UNIT HTR		H&V
	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION		VAV
	NUMBER OF ZONES				OTHER	VENT FAN FOR BLDG			
	COMMENT:								

NAMEPLATE:

				MFG.				MODEL	
	SUPPLY FAN HP			MFG.				MODEL	
20.0	RET/EXH FAN HP		**CENTURY**	MFG.		**SC-286U-FC5-5**		MODEL	
0	CFM-HTG	0	CFM-CLG	0%	MIN %OA	0%	MAX %OA	0.0%	% HTG AREA SERVED
COMMENT:									

COILS:

X	NONE		STM		HW		ELEC		MOD VLV	PREHEAT
X	NONE		STM		HW		ELEC		MOD VLV	HEATING
X	NONE		STM		HW		ELEC		MOD VLV	REHEAT
X	NONE		STM		HW		EVAP MEDIA		MOD VLV	HUMID.
X	NONE		DX		CW				MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	**NO**
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
				1	1	1	1	1			

CONTROLS:

		PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK			**NONE**
SPACE SETPOINT (°F):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	**N**	MIN OA (Y/N)	**N**	MAX OA (Y/N)	**N**	RA (Y/N)	**N**	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:	**Y**	YES		NO					
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE: **730EX2**

BLDG: **730**

AIR HANDLING UNIT SURVEY OBSERVATIONS

EX-2	AHU NO.	**MER**	LOCATION (RM)
NONE	REF. SYS. SERVING AHU	**ALL**	SERVES AREA

UNIT TYPE:

	SINGLE ZN		2-PIPE FC		4-PIPE FC		UNIT HTR		H&V
	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION		VAV
	NUMBER OF ZONES			X	OTHER	VENT FAN FOR BLDG			
	COMMENT:								

NAMEPLATE:

					MFG.				MODEL
	SUPPLY FAN HP				MFG.				MODEL
20.0	RET/EXH FAN HP		**CENTURY**		MFG.	**SC-286U-FC5-5**			MODEL
0	CFM-HTG	0	CFM-CLG	0%	MIN %OA	0%	MAX %OA	0.0%	% HTG AREA SERVED
COMMENT:									

COILS:

X	NONE		STM		HW		ELEC		MOD VLV	PREHEAT
X	NONE		STM		HW		ELEC		MOD VLV	HEATING
X	NONE		STM		HW		ELEC		MOD VLV	REHEAT
X	NONE		STM		HW		EVAP MEDIA		MOD VLV	HUMID.
X	NONE		DX		CW				MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	**NO**
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
				1	1	1	1	1			

CONTROLS:

		PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK			**NONE**
SPACE SETPOINT (°F):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	**N**	MIN OA (Y/N)	**N**	MAX OA (Y/N)	**N**	RA (Y/N)	**N**	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:	X	YES		NO					
COMMENTS:									

ANNUAL ENERGY SAVINGS SUMMARY FOR BATTALION HQ's - BUILDINGS 625, 631, 650, 658, 732, 740, 750, 753, 822, 825, 838, 842, 1008, 1009, 1022, & 1023

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Baseline Annual Electric (MBtu)	ECO 1 - Annual Electric (MBtu)	Annual Electric Energy Savings (MBtu)	Baseline Peak Electric Demand (kW)	ECO 1 - Peak Electric Demand (kW)	Peak Electric Demand Savings (kW)	Baseline Nat. Gas Energy Savings (MBtu)	ECO 1 - Annual Nat. Gas (MBtu)	Annual Nat. Gas Energy Savings (MBtu)
625	80.96	73.65	7.30	33.00	33.00	0.00	481.08	413.58	67.50

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 625 (SF)	Square Foot Adjust-ment Factor	Annual Electric Energy Savings (MBtu)	Adjusted Annual Electric Energy Savings* (MBtu)	Peak Electric Demand Savings (kW)	Adjusted Peak Electric Demand Savings* (kW)	Annual Nat. Gas Energy Savings (MBtu)	Adjusted Annual Nat. Gas Energy Savings* (MBtu)
631	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
650	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
658	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
732	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
740	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
750	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
753	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
822	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
825	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
838	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
842	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
1008	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
1009	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
1022	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
1023	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50

*Energy savings prorated on a square foot basis

ANNUAL ENERGY SAVINGS SUMMARY
FOR BATTALION HQ's - BUILDINGS 625, 631, 650, 658, 732, 740, 750, 753, 822, 825, 838, 842, 1008, 1009, 1022, & 1023

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Baseline Annual Electric (MBtu)	ECO 2 - Annual Electric (MBtu)	Annual Electric Energy Savings (MBtu)	Baseline Peak Electric Demand (kW)	ECO 2 - Peak Electric Demand (kW)	Peak Electric Demand Savings (kW)	Baseline Annual Nat. Gas (MBtu)	ECO 2 - Annual Nat. Gas (MBtu)	Annual Nat. Gas Energy Savings (MBtu)
625	80.96	73.21	7.75	33.00	33.00	0.00	481.08	410.60	70.48

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 625 (SF)	Square Foot Adjust-ment Factor	Annual Electric Energy Savings (MBtu)	Adjusted Annual Electric Energy Savings* (MBtu)	Peak Electric Demand Savings (kW)	Adjusted Peak Electric Demand Savings* (kW)	Annual Nat. Gas Energy Savings (MBtu)	Adjusted Annual Nat. Gas Energy Savings* (MBtu)
631	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
650	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
658	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
732	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
740	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
750	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
753	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
822	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
825	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
838	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
842	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
1008	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
1009	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
1022	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
1023	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48

*Energy savings prorated on a square foot basis

INVESTMENT COST SUMMARY
FOR BATTALION HQ's - BUILDINGS 625, 631, 650, 658, 732, 740, 750, 753, 822, 825, 838, 842, 1008, 1009, 1022, & 1023

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Investment Cost ($)
625	$37,132

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 625 (SF)	Square Foot Adjust-ment Factor	Investment Cost ($)	Adjusted Investment Cost ($)*
631	6,163	-	-	$40,135	-
650	6,163	6,163	1.000	$37,132	$37,132
658	6,163	6,163	1.000	$37,132	$37,132
732	6,163	6,163	1.000	$37,132	$37,132
740	6,163	6,163	1.000	$37,132	$37,132
750	6,163	6,163	1.000	$37,132	$37,132
753	6,163	6,163	1.000	$37,132	$37,132
822	6,163	6,163	1.000	$37,132	$37,132
825	6,163	6,163	1.000	$37,132	$37,132
838	6,163	6,163	1.000	$37,132	$37,132
842	6,163	6,163	1.000	$37,132	$37,132
1008	6,163	6,163	1.000	$37,132	$37,132
1009	6,163	6,163	1.000	$37,132	$37,132
1022	6,163	6,163	1.000	$37,132	$37,132
1023	6,163	6,163	1.000	$37,132	$37,132

*Investment Cost prorated on a square foot basis

INVESTMENT COST SUMMARY
FOR BATTALION HQ's - BUILDINGS 625, 631, 650, 658, 732, 740, 750, 753, 822, 825, 838, 842, 1008, 1009, 1022, & 1023

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building No.	Investment Cost ($)
625	$38,019

SIMILAR BUILDINGS

Building No.	Building (SF)	Building No. 625 (SF)	Square Foot Adjust-ment Factor	Investment Cost ($)*	Adjusted Investment Cost ($)*
631	6,163	-	-	$41,014	-
650	6,163	6,163	1.000	$38,019	$38,019
658	6,163	6,163	1.000	$38,019	$38,019
732	6,163	6,163	1.000	$38,019	$38,019
740	6,163	6,163	1.000	$38,019	$38,019
750	6,163	6,163	1.000	$38,019	$38,019
753	6,163	6,163	1.000	$38,019	$38,019
822	6,163	6,163	1.000	$38,019	$38,019
825	6,163	6,163	1.000	$38,019	$38,019
838	6,163	6,163	1.000	$38,019	$38,019
842	6,163	6,163	1.000	$38,019	$38,019
1008	6,163	6,163	1.000	$38,019	$38,019
1009	6,163	6,163	1.000	$38,019	$38,019
1022	6,163	6,163	1.000	$38,019	$38,019
1023	6,163	6,163	1.000	$38,019	$38,019

*Investment Cost prorated on a square foot basis

LIFE CYCLE COST ANALYSIS SUMMARY

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Leonard Wood	REGION: 2 (Missouri)		PROJECT NO:	1406-011
PROJECT TITLE:	Limited Energy Study, Insulate Brick Buildings			FISCAL YEAR:	1996
ANALYSIS DATE:	02/18/96	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz

1. INVESTMENT: **BLDG 625 - INSTALL 3.5" FIBERGLASS BATT INSULATION ON WALLS**

A.	CONSTRUCTION COST	=	$32,860	
B.	SIOH COST	(7.0% of 1A) =	$2,300	
C.	DESIGN COST	(6.0% of 1A) =	$1,972	
D.	TOTAL COST	(1A +1B +1C) =	$37,132	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT	=	$0	
F.	PUBLIC UTILITY COMPANY REBATE	=	$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$37,132

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96

	ENERGY SOURCE	FUEL COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$7.33	7.30	$53	13.80	$738	
B.	DIST	$0.00	0	$0	0.00	$0	
C.	NAT GAS	$5.30	67.50	$358	17.76	$6,354	
D.	COAL	$0.00	0	$0	0.00	$0	
E.	ELEC. DEMAND			$0	13.47	$0	
F.	TOTAL		74.80	$411		-------->	$7,092

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1	ANNUAL MAINTENANCE	$0	$0
2		$0	$0
3		$0	$0
4	TOTAL ANNUAL DISC. SAVINGS (+) / COST	$0	$0

B. NON-RECURRING (+/-)

	ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)	
a.	BASELINE EQUIP. REPLCMNT.				$0	
b.					$0	
c.					$0	
d.					$0	
e.					$0	
f.	TOTAL	$0			$0	

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = $0

4.	FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-)	(2F3+3A4+(3Bf1/Economic Life))	$411
5.	SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY)	(1G/4) =	90.30
6.	TOTAL NET DISCOUNTED SAVINGS	(2F5 + 3C) =	$7,092
7.	DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (MUST HAVE SIR > 1.25 TO QUALIFY)	(6/1G) =	0.19

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood,MO	SHEET 1 OF 1	
ENGINEER	E M C Engineers, Inc.	DATE PREPARED	18-Feb-96
	Denver, CO	ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST Quantity	Unit Cost	Total	LABOR COST Crew/ Worker	Hours/ Unit	Total	TOTAL
1		**BUILDING 625**								
2		**INSTALL 3.5" BATT INSULATION ON WALLS**								
3										
4	I3-1/2I	INSTALL 3-1/2" BATT INSULATION	S.F.	3370.0	$0.18	$611	1-CARP	0.007	$620	$1,231
5	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	3234.0	$0.20	$648	2-CARP	0.017	$2,889	$3,537
6	ISW	INSTALL 2"x4" STUDDED WALL 2' OC	L.F.	2728.0	$0.24	$643	F-2	0.009	$1,353	$1,996
7	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	3370.0	$0.07	$225	1-PORD	0.01	$813	$1,038
8	R15WMH	RELOCATE 15' BASEBOARD RADIATION	EA.	3.0	$18.39	$55	Q-6	5	$1,312	$1,367
9	REES	RELOCATE ELECTRICAL EXIT SIGN	EA.	2.0	$0.00	$0	1-ELEC	1.5	$91	$91
10	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	4.0	$8.82	$35	1-ELEC	0.844	$103	$138
11	REO	RELOCATE ELECTRICAL OUTLET	EA.	8.0	$7.97	$64	1-ELEC	0.896	$218	$282
12	RKB	RELOCATE KEY BOX	EA.	1.0	$0.00	$0	1-CARP	0.65	$17	$17
13	RPDMS	RELOCATE PULL DOWN MOVIE SCREEN	S.F.	1.0	$0.00	$0	2-CARP	1.5	$79	$79
14	RTJ	RELOCATE TELEPHONE JACK	EA.	2.0	$20.03	$40	1-ELEC	0.333	$20	$60
15	RTS	RELOCATE TOILET STALL	EA.	2.0	$0.00	$0	2-CARP	3.536	$372	$372
16	RWMTS	RELOCATE WALL MOUNTED TELEVISION SET	EA.	3.0	$28.72	$86	L-2	3.42	$476	$562
17	RWP	RELOCATE 1/2" HW & CW DOMESTIC PIPING	EA.	2.0	$25.05	$50	Q-1	4.546	$512	$562
18	RWS	RELOCATE WOOD SHELF	L.F.	2.0	$1.22	$2	1-CARP	0.12	$6	$9
19	RWTC	RELOCATE WATER CLOSET	EA.	2.0	$35.83	$72	Q-2	10.904	$1,911	$1,983
20	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	L.F.	328.0	$1.14	$375	1-CARP	0.134	$1,155	$1,530
21	R24WMH	RELOCATE 24' BASEBOARD RADIATION	EA.	2.0	$18.39	$37	Q-6	5.68	$994	$1,030
22	R12WMH	RELOCATE 12' BASEBOARD RADIATION	EA.	2.0	$18.39	$37	Q-6	5.25	$918	$955
23	R6WMH	RELOCATE 6' BASEBOARD RADIATION	EA.	3.0	$18.39	$55	Q-6	4.68	$1,228	$1,283
24	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	136.0	$0.84	$114	2-CARP	0.02	$143	$257
25	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	136.0	$1.83	$249	2-TILE	0.084	$553	$802
26	RDR	RELOCATE DRAPERIES, WINDOW SHADES	EA.	36.0	$0.00	$0	L-2	0.744	$1,243	$1,243
27		**SUBTOTAL**				$3,399			$17,027	$20,426
28	DIFF	DIFFICULTLY FACTOR			5%				$851	$851
29		**SUBTOTAL**				$3,399			$17,878	$21,277
30	OH	OVERHEAD			17%	$578			$3,039	$3,617
31		**SUBTOTAL**				$3,977			$20,917	$24,894
32	PRO	PROFIT			10%	$398			$2,092	$2,489
33		**SUBTOTAL**				$4,374			$23,009	$27,383
34	CONT	CONTINGENCY			20%	$875			$4,602	$5,477
35	**TOTAL COST**					$5,249			$27,611	$32,860

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Leonard Wood	REGION: 2 (Missouri)		PROJECT NO:	1406-011
PROJECT TITLE:	Limited Energy Study, Insulate Brick Buildings			FISCAL YEAR:	1996
ANALYSIS DATE:	02/18/96	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz

1. INVESTMENT: **BLDG 625 - INSTALL 1.5" RIGID INSULATION ON WALLS**

A.	CONSTRUCTION COST	=	$33,645	
B.	SIOH COST	(7.0% of 1A) =	$2,355	
C.	DESIGN COST	(6.0% of 1A) =	$2,019	
D.	TOTAL COST	(1A +1B +1C) =	$38,019	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT	=	$0	
F.	PUBLIC UTILITY COMPANY REBATE	=	$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$38,019

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96

	ENERGY SOURCE	FUEL COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$7.33	7.75	$57	13.80	$783	
B.	DIST	$0.00	0	$0	0.00	$0	
C.	NAT GAS	$5.30	70.48	$374	17.76	$6,634	
D.	COAL	$0.00	0	$0	0.00	$0	
E.	ELEC. DEMAND			$0	13.47	$0	
F.	TOTAL		78.23	$430		-------->	$7,418

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1	ANNUAL MAINTENANCE	$0	0.00	$0
2		$0	0.00	$0
3		$0	0.00	$0
4	TOTAL ANNUAL DISC. SAVINGS (+) / COST	$0		$0

B. NON-RECURRING (+/-)

ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)
a. BASELINE EQUIP. REPLCMNT.				$0
b.				$0
c.				$0
d.				$0
e.				$0
f. TOTAL	$0			$0

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = $0

4.	FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-)	(2F3 + 3A4 + (3Bf1/Economic Life))	$430
5.	SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY)	(1G/4) =	88.35
6.	TOTAL NET DISCOUNTED SAVINGS	(2F5 + 3C) =	$7,418
7.	DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (MUST HAVE SIR > 1.25 TO QUALIFY)	(6/1G) =	0.20

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	SHEET 1 OF 1	
ENGINEER	E M C Engineers, Inc. Denver, CO	DATE PREPARED	18-Feb-96
		ESTIMATOR	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST Quantity	Unit Cost	Total	LABOR COST Crew/ Worker	Hours/ Unit	Total	TOTAL
1		**BUILDING 625**								
2		**INSTALL 1.5" RIGID INSULATION ON WALLS**								
3										
4	I1-1/2RI	INSTALL 1-1/2" RIGID INSULATION	S.F.	3370.0	$0.59	$1,993	1-CARP	0.008	$708	$2,702
5	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	3234.0	$0.20	$648	2-CARP	0.017	$2,889	$3,537
6	IFS	INSTALL 3/4"x2" FURRING STRIPS	L.F.	1734.0	$0.19	$331	1-CARP	0.016	$729	$1,060
7	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	3370.0	$0.07	$225	1-PORD	0.01	$813	$1,038
8	R15WMH	RELOCATE 15' BASEBOARD RADIATION	EA.	3.0	$18.39	$55	Q-6	5	$1,312	$1,367
9	REES	RELOCATE ELECTRICAL EXIT SIGN	EA.	2.0	$0.00	$0	1-ELEC	1.5	$91	$91
10	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	4.0	$8.82	$35	1-ELEC	0.844	$103	$138
11	REO	RELOCATE ELECTRICAL OUTLET	EA.	8.0	$7.97	$64	1-ELEC	0.896	$218	$282
12	RKB	RELOCATE KEY BOX	EA.	1.0	$0.00	$0	1-CARP	0.65	$17	$17
13	RPDMS	RELOCATE PULL DOWN MOVIE SCREEN	S.F.	1.0	$0.00	$0	2-CARP	1.5	$79	$79
14	RTJ	RELOCATE TELEPHONE JACK	EA.	2.0	$20.03	$40	1-ELEC	0.333	$20	$60
15	RTS	RELOCATE TOILET STALL	EA.	2.0	$0.00	$0	2-CARP	3.536	$372	$372
16	RWMTS	RELOCATE WALL MOUNTED TELEVISION SET	EA.	3.0	$28.72	$86	L-2	3.42	$476	$562
17	RWP	RELOCATE 1/2" HW & CW DOMESTIC PIPING	EA.	2.0	$25.05	$50	Q-1	4.546	$512	$562
18	RWS	RELOCATE WOOD SHELF	L.F.	2.0	$1.22	$2	1-CARP	0.12	$6	$9
19	RWTC	RELOCATE WATER CLOSET	EA.	2.0	$35.83	$72	Q-2	10.904	$1,911	$1,983
20	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	L.F.	328.0	$1.14	$375	1-CARP	0.134	$1,155	$1,530
21	R24WMH	RELOCATE 24' BASEBOARD RADIATION	EA.	2.0	$18.39	$37	Q-6	5.68	$994	$1,030
22	R12WMH	RELOCATE 12' BASEBOARD RADIATION	EA.	2.0	$18.39	$37	Q-6	5.25	$918	$955
23	R6WMH	RELOCATE 6' BASEBOARD RADIATION	EA.	3.0	$18.39	$55	Q-6	4.68	$1,228	$1,283
24	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	136.0	$0.84	$114	2-CARP	0.02	$143	$257
25	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	136.0	$1.83	$249	2-TILE	0.084	$553	$802
26	RDR	RELOCATE DRAPERIES, WINDOW SHADES	EA.	36.0	$0.00	$0	L-2	0.744	$1,243	$1,243
27		**SUBTOTAL**				$4,469			$16,491	$20,961
28	DIFF	DIFFICULTLY FACTOR			5%				$825	$825
29		**SUBTOTAL**				$4,469			$17,316	$21,785
30	OH	OVERHEAD			17%	$760			$2,944	$3,703
31		**SUBTOTAL**				$5,229			$20,259	$25,489
32	PRO	PROFIT			10%	$523			$2,026	$2,549
33		**SUBTOTAL**				$5,752			$22,285	$28,037
34	CONT	CONTINGENCY			20%	$1,150			$4,457	$5,607
35	**TOTAL COST**					$6,902			$26,742	$33,645

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood,MO	**SHEET** 1 **OF** 1	
ENGINEER	E M C Engineers, Inc.	**DATE PREPARED**	18-Feb-96
	Denver, CO	**ESTIMATOR**	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST Quantity	Unit Cost	Total	LABOR COST Crew/ Worker	Hours/ Unit	Total	TOTAL
1		**BUILDING 631**								
2		**INSTALL 3.5" BATT INSULATION ON WALLS**								
3										
4	I3-1/2I	INSTALL 3-1/2" BATT INSULATION	S.F.	3370.0	$0.18	$611	1-CARP	0.007	$620	$1,231
5	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	3234.0	$0.20	$648	2-CARP	0.017	$2,889	$3,537
6	ISW	INSTALL 2"x4" STUDDED WALL 2' OC	L.F.	2728.0	$0.24	$643	F-2	0.009	$1,353	$1,996
7	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	3370.0	$0.07	$225	1-PORD	0.01	$813	$1,038
8	R15WMH	RELOCATE 15' BASEBOARD RADIATION	EA.	3.0	$18.39	$55	Q-6	5	$1,312	$1,367
9	REES	RELOCATE ELECTRICAL EXIT SIGN	EA.	3.0	$0.00	$0	1-ELEC	1.5	$137	$137
10	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	5.0	$8.82	$44	1-ELEC	0.844	$128	$173
11	REO	RELOCATE ELECTRICAL OUTLET	EA.	9.0	$7.97	$72	1-ELEC	0.896	$245	$317
12	RKB	RELOCATE KEY BOX	EA.	1.0	$0.00	$0	1-CARP	0.65	$17	$17
13	RTJ	RELOCATE TELEPHONE JACK	EA.	2.0	$20.03	$40	1-ELEC	0.333	$20	$60
14	RTS	RELOCATE TOILET STALL	EA.	2.0	$0.00	$0	2-CARP	3.536	$372	$372
15	RWP	RELOCATE 1/2" HW & CW DOMESTIC PIPING	EA.	2.0	$25.05	$50	Q-1	4.546	$512	$562
16	RWS	RELOCATE WOOD SHELF	L.F.	2.0	$1.22	$2	1-CARP	0.12	$6	$9
17	RWTC	RELOCATE WATER CLOSET	EA.	2.0	$35.83	$72	Q-2	10.904	$1,911	$1,983
18	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	L.F.	328.0	$1.14	$375	1-CARP	0.134	$1,155	$1,530
19	R24WMH	RELOCATE 24' BASEBOARD RADIATION	EA.	2.0	$18.39	$37	Q-6	5.68	$994	$1,030
20	R12WMH	RELOCATE 12' BASEBOARD RADIATION	EA.	2.0	$18.39	$37	Q-6	5.25	$918	$955
21	R6WMH	RELOCATE 6' BASEBOARD RADIATION	EA.	3.0	$18.39	$55	Q-6	4.68	$1,228	$1,283
22	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDED	S.F.	136.0	$0.84	$114	2-CARP	0.02	$143	$257
23	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	136.0	$1.83	$249	2-TILE	0.084	$553	$802
24	RFAPB	RELOCATE FIRE ALARM PULL BOX	EA.	2.0	$0.00	$0	1-ELEC	1.6	$97	$97
25	RFE	RELOCATE FIRE EXTINGUISHER	EA.	2.0	$0.00	$0	1-CARP	0.2	$11	$11
26	REP	RELOCATE ELECTRICAL PANEL	EA.	1.0	$0.00	$0	1-ELEC	12.191	$371	$371
27	REDS	RELOCATE ELECTRIC DISCONNECT SWITCH	EA.	2.0	$0.00	$0	1-ELEC	5.2	$317	$317
28	RFSS	RELOCATE FIRE SUPPRESSION SYSTEM	EA.	2.0	$0.00	$0	Q-2	16	$2,804	$2,804
29	RDR	RELOCATE DRAPERIES, WINDOW SHADES	EA.	30.0	$0.00	$0	L-2	0.744	$1,036	$1,036
30		**SUBTOTAL**				$3,329			$19,963	$23,293
31	DIFF	DIFFICULTLY FACTOR			5%				$998	$998
32		**SUBTOTAL**				$3,329			$20,961	$24,291
33	OH	OVERHEAD			17%	$566			$3,563	$4,129
34		**SUBTOTAL**				$3,895			$24,525	$28,420
35	PRO	PROFIT			10%	$390			$2,452	$2,842
36		**SUBTOTAL**				$4,285			$26,977	$31,262
37	CONT	CONTINGENCY			20%	$857			$5,395	$6,252
38	**TOTAL COST**					$5,142			$32,372	$37,514
39	SIOH COST				6%	$309			$1,942	$2,251
40	DESIGN COST				6%	$309			$1,942	$2,251
41	**TOTAL INVESTMENT**					$5,759			$36,257	$42,016

ENGINEER'S OPINION OF PROBABLE COST

PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	**SHEET**	1 OF 1
ENGINEER	E M C Engineers, Inc.	**DATE PREPARED**	18-Feb-96
	Denver, CO	**ESTIMATOR**	D. Sinz
		CHECKED BY	A. Niemeyer

Line No.	Item Refer Code	Item Description	Unit of Measure	MATERIAL COST Quantity	Unit Cost	Total	LABOR COST Crew/ Worker	Hours/ Unit	Total	TOTAL
1		**BUILDING 631**								
2		**INSTALL 1.5" RIGID INSULATION ON WALLS**								
3										
4	I1-1/2RI	INSTALL 1-1/2" RIGID INSULATION	S.F.	3370.0	$0.59	$1,993	1-CARP	0.008	$708	$2,702
5	ID	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	3234.0	$0.20	$648	2-CARP	0.017	$2,889	$3,537
6	IFS	INSTALL 3/4"x2" FURRING STRIPS	L.F.	1734.0	$0.19	$331	1-CARP	0.016	$729	$1,060
7	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	3370.0	$0.07	$225	1-PORD	0.01	$813	$1,038
8	R15WMH	RELOCATE 15' BASEBOARD RADIATION	EA.	3.0	$18.39	$55	Q-6	5	$1,312	$1,367
9	REES	RELOCATE ELECTRICAL EXIT SIGN	EA.	3.0	$0.00	$0	1-ELEC	1.5	$137	$137
10	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	5.0	$8.82	$44	1-ELEC	0.844	$128	$173
11	REO	RELOCATE ELECTRICAL OUTLET	EA.	9.0	$7.97	$72	1-ELEC	0.896	$245	$317
12	RKB	RELOCATE KEY BOX	EA.	1.0	$0.00	$0	1-CARP	0.65	$17	$17
13	RTJ	RELOCATE TELEPHONE JACK	EA.	2.0	$20.03	$40	1-ELEC	0.333	$20	$60
14	RTS	RELOCATE TOILET STALL	EA.	2.0	$0.00	$0	2-CARP	3.536	$372	$372
15	RWP	RELOCATE 1/2" HW & CW DOMESTIC PIPING	EA.	2.0	$25.05	$50	Q-1	4.546	$512	$562
16	RWS	RELOCATE WOOD SHELF	L.F.	2.0	$1.22	$2	1-CARP	0.12	$6	$9
17	RWTC	RELOCATE WATER CLOSET	EA.	2.0	$35.83	$72	Q-2	10.904	$1,911	$1,983
18	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	L.F.	328.0	$1.14	$375	1-CARP	0.134	$1,155	$1,530
19	R24WMH	RELOCATE 24' BASEBOARD RADIATION	EA.	2.0	$18.39	$37	Q-6	5.68	$994	$1,030
20	R12WMH	RELOCATE 12' BASEBOARD RADIATION	EA.	2.0	$18.39	$37	Q-6	5.25	$918	$955
21	R6WMH	RELOCATE 6' BASEBOARD RADIATION	EA.	3.0	$18.39	$55	Q-6	4.68	$1,228	$1,283
22	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDED	S.F.	136.0	$0.84	$114	2-CARP	0.02	$143	$257
23	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	136.0	$1.83	$249	2-TILE	0.084	$553	$802
24	RFAPB	RELOCATE FIRE ALARM PULL BOX	EA.	2.0	$0.00	$0	1-ELEC	1.6	$97	$97
25	RFE	RELOCATE FIRE EXTINGUISHER	EA.	2.0	$0.00	$0	1-CARP	0.2	$11	$11
26	REP	RELOCATE ELECTRICAL PANEL	EA.	1.0	$0.00	$0	1-ELEC	12.191	$371	$371
27	REDS	RELOCATE ELECTRIC DISCONNECT SWITCH	EA.	2.0	$0.00	$0	1-ELEC	5.2	$317	$317
28	RFSS	RELOCATE FIRE SUPPRESSION SYSTEM	EA.	2.0	$0.00	$0	Q-2	16	$2,804	$2,804
29	RDR	RELOCATE DRAPERIES, WINDOW SHADES	EA.	30.0	$0.00	$0	L-2	0.744	$1,036	$1,036
30		**SUBTOTAL**				$4,400			$19,427	$23,827
31	DIFF	DIFFICULTLY FACTOR			5%				$971	$971
32		**SUBTOTAL**				$4,400			$20,399	$24,799
33	OH	OVERHEAD			17%	$748			$3,468	$4,216
34		**SUBTOTAL**				$5,148			$23,867	$29,015
35	PRO	PROFIT			10%	$515			$2,387	$2,901
36		**SUBTOTAL**				$5,663			$26,253	$31,916
37	CONT	CONTINGENCY			20%	$1,133			$5,251	$6,383
38	**TOTAL COST**					$6,795			$31,504	$38,299
39	SIOH COST				6%	$408			$1,890	$2,298
40	DESIGN COST				6%	$408			$1,890	$2,298
41	**TOTAL INVESTMENT**					$7,611			$35,284	$42,895

E M C ENGINEERS, INC.

DATE:	Feb-96
BY:	DMS
JOB:	1406.011
CHK:	AJN
FILE:	625BHL

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT LEONARD WOOD, MO.

BUILDING HEATING LOAD CALCULATION SHEET

BLDG NO: 625 BLDG NAME: BATTALION HQ

BLDG FUNCTION: ADMINISTRATION AND CLASSROOMS

FLOOR AREA: (SQ. FT) 5,795 # FLOORS 1

SLAB PERIMETER: (FT) 312

I. AREAS: ([ ] FIELD VERIFIED ELEVATION PLANS)

		NORTH	SOUTH	EAST	WEST	TOTAL
WALLS, GROSS	(SQ. FT)	1,303	1,135	587	981	4,006
GLASS	(SQ. FT)	180	135	105	90	510
PERSONNEL DOOR	(SQ. FT)	84	0	0	42	126
INSULATED PANEL	(SQ. FT)	117	68	58	234	477
WALLS, NET	(SQ. FT)	922	932	424	615	2,893
ROOF AREA (OR CEILING AREA IF ATTIC IS UNCONDITIONED)					(SQ. FT)	5,795
INSULATED PANEL	(SQ. FT)	477	PERSONNEL DOOR		(SQ. FT)	126
BASEMENT WALLS	(SQ. FT)	0	0	0	0	0

II. CONSTRUCTION: ([ ] FIELD VERIFIED WALL, ROOF, WINDOW, DOOR TYPES)

WALLS: (SKETCH CROSS SECTION OF WALL)		COMPONENTS	R-VALUE
	1.	OUTSIDE AIR FILM	0.17
	2.	4" FACE BRICK	0.43
	3.	AIR SPACE	0.91
	4.	6" CMU	1.89
	5.		
	6.		
	7.	INSIDE AIR FILM	0.68
		TOTAL R-WALL =	4.08
		U=1/R	0.245

ROOF: (SKETCH CROSS SECTION OF ROOF)		COMPONENTS	R-VALUE
	1.	OUTSIDE AIR FILM	0.17
	2.	BUILT UP ROOF	0.34
	3.	1" RIGID INSUL	4.00
	4.	AIR SPACE	0.91
	5.	6" FG BATT INSUL	19.00
	6.	ACOUSTIC TILE	1.35
	7.	INSIDE AIR FILM	0.68
		TOTAL R-ROOF =	26.45
		U=1/R	0.038

GLASS TYPE:	PPG 'PENNVERNON' C.L. TWNDV, SSA, .88 S.C.	R-GLASS	1.61
SLAB TYPE FLOOR:	CONCRETE	SLF	0.83
BASEMENT TYPE:	NONE	R-BASEM.	0.00
INSULATED PANEL:		R-PANEL	4.20
PERSONNEL DOOR TYPE:	METAL	R-PDOOR	2.56

III. INFILTRATION:

TIGHT WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
AVG. WALL H/M/L (SQ.FT.)	L	4006	X CFM / SQ.FT.	0.092	=	369
LEAKY WALL H/M/L (SQ.FT.)			X CFM / SQ.FT.	0.000	=	0
DOOR OPENINGS / HR - SINGLE DOOR		20	X CFM /OPENING /HR	1.600	=	32
DOOR OPENINGS / HR - DOUBLE DOORS		25	X CFM /OPENING /HR	1.385	=	35
			TOTAL INFILTRATION (CFM)		=	435

UA PANEL	PANEL AREA	477	X PANEL "U"	0.238	=	114
UA PDOOR	PDOOR AREA	126	X DOOR "U"	0.391	=	49
UA WALL	WALL AREA	2,893	X WALL "U"	0.245	=	709
UA ROOF	ROOF AREA	5,795	X ROOF "U"	0.038	=	219
UA GLASS	GLASS AREA	510	X GLASS "U"	0.621	=	317
UA SLAB	SLAB PERIM.	312	X SLF	0.830	=	259
UA BASEM.	B-WALL AREA	0	X BASE. "U"	0.000	=	0
INFILTRATION	CFM	435	X A. T. F.	1.035	=	450
			TOTAL UA (BTU/HR°F)			2,117

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 625Z1.XLS
BLDG: **625** ZONE: **1**

Rates of Heat Gain from Occupants of Conditioned Spaces

Zone No.	No. of People	Activ. Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)
1	50	2	Seated very light work (writing)	Offices, hotels, apts	245	155	12,250	7,750
TOTAL	50					TOTAL	12,250	7,750

Peak Wattage Value for Lights

Zone No.	No. of Fixtures	Fixture Type	Description	Watts/ Fixture	Total Wattage
1	42	8	Fluorescent, 4 - 34w lamps, 2 - 16w ballasts (2x4 ft. fix.)	168	7,056
	35	6	Fluorescent, 2 - 34w lamps, 16w ballast (2x4 ft. fixture)	84	2,940
	15	18	Incandescent - 60w	60	900
TOTAL	92			TOTAL	10,896

Peak Value for Internal Gains

Zone No.	No. of Equip.	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattage	Total (BTU)
1	6	62	Television (Color, tube)	300	15%	1,800	6,143
	1	48	Paper Shredder	1,625	20%	1,625	5,546
	6	5	Printer (laser)	870	34%	5,220	17,816
	3	12	Typewriter	100	10%	300	1,024
	1	24	Coffee Maker	1,500	30%	1,500	5,120
	1	10	Copiers (Large)	1,570	20%	1,570	5,358
	1	25	Cold Food/Beverage	1,535	50%	1,535	1,535
	9	3	Microcomputer	350	91%	3,150	10,751
				TOTAL	41%	16,700	53,293

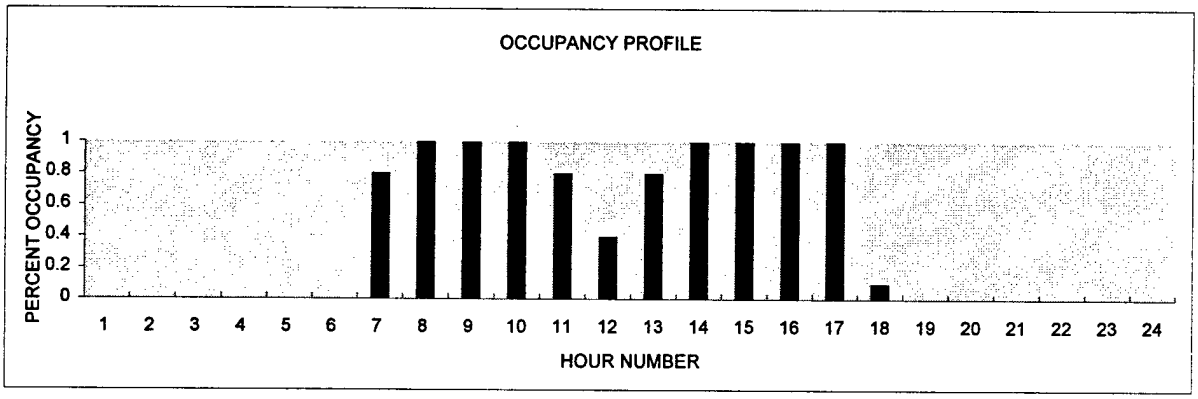
V:\1406.011\COLECTD\FIELD\PLE\625Z1.XLS

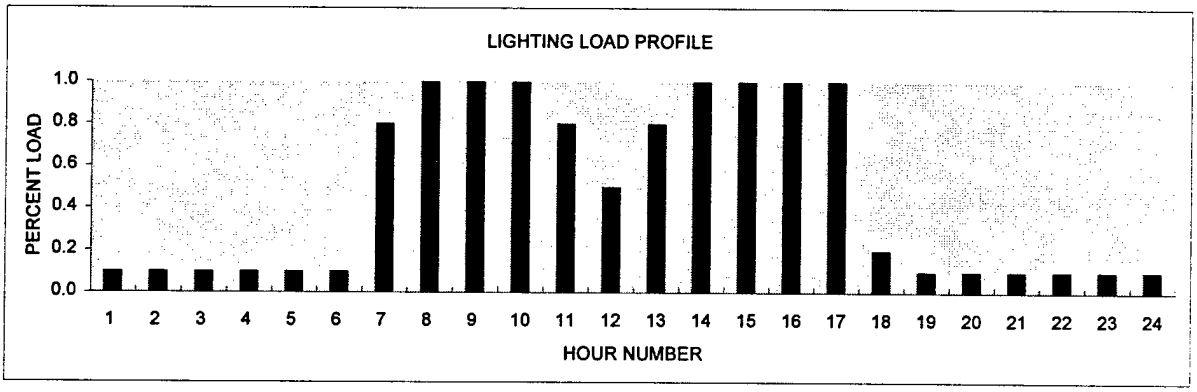
EMC Engineers, Inc.

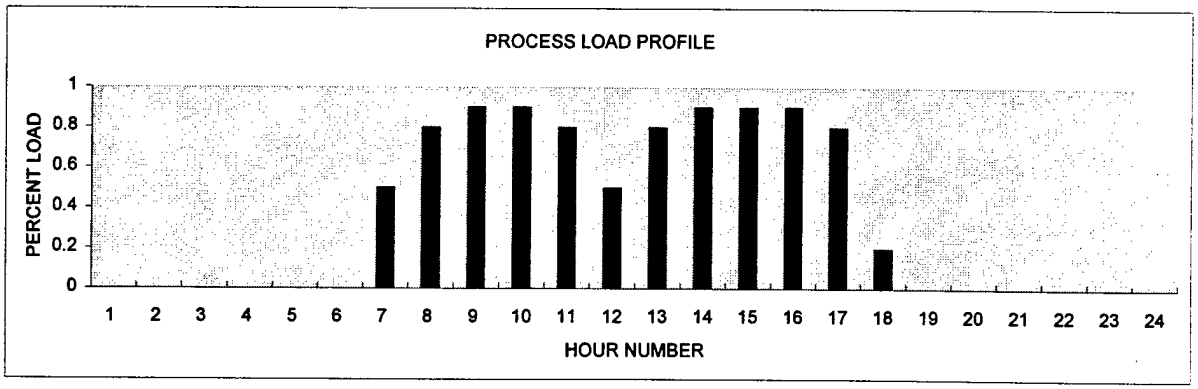
PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA01-94-D-0033
LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 625Z1.XLS
BLDG: 625
ZONE: 1

BLD TYPE	BLDG FUNCTION	TYPE OF PROFILE	HOUR NUMBER																							
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
3	Administration	OCCUPANCY	0	0	0	0	0	0	0.8	1	1	1	0.8	0.4	0.8	1	1	1	1	0.1	0	0	0	0	0	0
		LIGHTING	0.1	0.1	0.1	0.1	0.1	0.1	0.8	1	1	1	0.8	0.5	0.8	1	1	1	1	0.2	0.1	0.1	0.1	0.1	0.1	0.1
		PROCESS	0	0	0	0	0	0	0.5	0.8	0.9	0.9	0.8	0.5	0.8	0.9	0.9	0.9	0.8	0.2	0	0	0	0	0	0







BLDG 625 - BATTALION HQ BASELINE

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.850	.850	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.243	.244	.244
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01837	.01822	.01829	.01829
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00003	.00003	.00003	.00003
N=2	.00283	.00280	.00281	.00281
N=3	.01017	.01008	.01012	.01012
N=4	.00498	.00494	.00496	.00496
N=5	.00037	.00036	.00036	.00036
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	-.07415	-.07415	-.07415	-.07415
N=5	.00212	.00212	.00212	.00212
N=6	********	********	********	********

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.800000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 2.021078E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .186E-05 .279E-04 .922E-04 .689E-04 .130E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	BTU/HR			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
  9        1.000      .900      1.000     1.000        70.0        76.0
 10        1.000      .900      1.000     1.000        70.0        76.0
 11         .800      .800       .800      .800        70.0        76.0
 12         .500      .500       .400      .400        70.0        76.0
 13         .800      .800       .800      .800        70.0        76.0
 14        1.000      .900      1.000     1.000        70.0        76.0
 15        1.000      .900      1.000     1.000        70.0        76.0
 16        1.000      .900      1.000     1.000        70.0        76.0
 17        1.000      .800      1.000     1.000        70.0        76.0
 18         .200      .200       .100      .100        70.0        76.0
 19         .100      .000       .000      .000        70.0        76.0
 20         .100      .000       .000      .000        70.0        76.0
 21         .100      .000       .000      .000        70.0        76.0
 22         .100      .000       .000      .000        70.0        76.0
 23         .100      .000       .000      .000        70.0        76.0
 24         .100      .000       .000      .000        70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)     9430.000000
ECONOMIZER HIGH TEMP LIMIT F        68.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)            4
COOLING PLANT RATED OUTPUT BTU (CFLOT)   360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 625 - BATTALION HQ BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-76.47	LOSS		-1.14	-8.90	.00	-17.21	-7.08	-73.62	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.06	.00	.00	.00
	-58.94	LOSS		-.95	-7.54	.00	-12.89	-6.02	-62.34	.00
MAR	.94	GAIN	11.72	.00	.00	.00	.78	.00	.00	.02
	-45.17	LOSS		-.84	-7.02	.00	-10.33	-5.59	-56.71	.00
APR	10.37	GAIN	11.93	.01	.04	.00	2.43	.03	.27	1.64
	-16.81	LOSS		-.48	-4.19	.00	-5.08	-3.34	-32.11	.00
MAY	25.18	GAIN	13.07	.03	.14	.00	4.54	.11	.87	6.48
	-1.92	LOSS		-.24	-2.52	.00	-2.16	-1.94	-19.16	.00
JUN	60.38	GAIN	13.17	.09	.40	.00	6.92	.32	2.62	25.55
	.00	LOSS		-.09	-1.19	.00	-.62	-.91	-8.72	.00
JUL	84.52	GAIN	13.38	.18	1.02	.00	9.25	.82	6.90	36.33
	.00	LOSS		-.05	-.73	.00	-.29	-.57	-5.45	.00
AUG	78.93	GAIN	11.73	.13	.77	.00	7.76	.60	4.98	35.96
	.00	LOSS		-.05	-.81	.00	-.36	-.62	-5.27	.00
SEP	43.52	GAIN	10.12	.05	.39	.00	4.51	.32	2.74	19.82
	-2.94	LOSS		-.21	-1.97	.00	-1.94	-1.55	-14.61	.00
OCT	8.73	GAIN	8.62	.00	.06	.00	1.34	.05	.39	2.68
	-14.07	LOSS		-.52	-4.00	.00	-5.62	-3.12	-29.31	.00
NOV	1.48	GAIN	6.92	.00	.00	.00	.31	.00	.00	.40
	-35.42	LOSS		-.76	-5.76	.00	-9.96	-4.49	-43.86	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.01	.00	.00	.00
	-74.70	LOSS		-1.14	-8.71	.00	-17.27	-6.85	-70.54	.00
TOT	314.	GAIN	124.	0.	3.	0.	38.	2.	19.	129.
	-326.	LOSS		-6.	-53.	0.	-84.	-42.	-422.	0.

MAX HEATING LOAD= -272020. BTUH ON DEC 18 HOUR 8 AMBIENT TEMP 1.
MAX COOLING LOAD= 283222. BTUH ON JUL 23 HOUR 14 AMBIENT TEMP 68.

ZONE UA BTU/HR-F 1408.0

BLDG 625 - BATTALION HQ BASELINE

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	76.		4	17	62.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	70.	76.		13	17	64.	2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	77.		12	15	72.	3.26	12.57	4.22	23.72
			69.	4	6	15.				
APR	73.	78.		30	16	84.	3.14	12.09	4.08	22.85
			69.	9	6	30.				
MAY	75.	78.		15	15	80.	3.32	12.81	4.22	24.09
			70.	11	6	39.				
JUN	76.	78.		27	15	89.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	77.	78.		13	15	91.	3.26	12.57	4.22	23.72
			73.	10	6	60.				
AUG	77.	78.		30	14	87.	3.32	12.81	4.22	24.09
			71.	25	7	55.				
SEP	75.	78.		11	14	85.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73.	78.		5	15	73.	3.32	12.81	4.22	24.09
			69.	28	6	33.				
NOV	71.	77.		8	16	75.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	74.		12	17	52.	3.20	12.33	4.22	23.35
			67.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ BASELINE

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	655	2	1	0	-.2720E+06	.0000
FEB	535	0	0	0	-.2328E+06	.0000
MAR	477	29	0	0	-.2352E+06	.1053E+06
APR	239	149	0	0	-.1465E+06	.1556E+06
MAY	38	317	0	0	-.9833E+05	.1914E+06
JUN	0	483	0	0	.0000	.2522E+06
JUL	0	607	0	0	.0000	.2832E+06
AUG	0	589	0	0	.0000	.2581E+06
SEP	65	367	0	0	-.9602E+05	.2404E+06
OCT	237	130	0	0	-.1369E+06	.1826E+06
NOV	435	39	0	0	-.1979E+06	.1295E+06
DEC	684	0	10	0	-.2720E+06	.0000
YEAR	3365	2712	11	0	-.2720E+06	.2832E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	107.34	.00	3.32	12.81	1.24	24.09	12.6
FEB	83.82	.00	2.95	11.38	1.12	21.47	12.6
MAR	66.95	.08	3.26	12.57	1.24	23.72	20.8
APR	27.43	.85	3.14	12.09	1.20	22.85	23.8
MAY	3.62	1.96	3.32	12.81	1.24	24.09	26.2
JUN	.00	4.50	3.14	12.09	1.20	22.85	30.7
JUL	.00	6.32	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.91	3.32	12.81	1.24	24.09	31.2
SEP	5.79	3.29	3.08	11.86	1.20	22.48	29.8
OCT	24.56	.70	3.32	12.81	1.24	24.09	25.6
NOV	54.86	.12	3.20	12.33	1.20	23.22	22.2
DEC	106.71	.00	3.20	12.33	1.24	23.35	12.6
YEAR	481.08	23.72	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 153870. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ BASELINE

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2720E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2328E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1053E+06	-.2352E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1556E+06	-.1465E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1914E+06	-.9833E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2522E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2832E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2581E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2404E+06	-.9602E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1826E+06	-.1369E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1295E+06	-.1979E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2720E+06

BLDG 625 - BATTALION HQ - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALLS

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA ----------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.850	.850	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.064	.064	.064	.064
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00176	.00176	.00176	.00176
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00016	.00016	.00016	.00016
N=3	.00086	.00086	.00086	.00086
N=4	.00066	.00066	.00066	.00066
N=5	.00008	.00008	.00008	.00008
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	-.16643	-.16643	-.16643	-.16643
N=5	.00728	.00728	.00728	.00728
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.800000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 2.021078E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .186E-05 .279E-04 .922E-04 .689E-04 .130E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

					THERMOSTAT SET POINT DEG F	
	KW	- - - - - - BTU/HR - - - - - -				
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
   9        1.000      .900      1.000      1.000        70.0        76.0
  10        1.000      .900      1.000      1.000        70.0        76.0
  11         .800      .800       .800       .800        70.0        76.0
  12         .500      .500       .400       .400        70.0        76.0
  13         .800      .800       .800       .800        70.0        76.0
  14        1.000      .900      1.000      1.000        70.0        76.0
  15        1.000      .900      1.000      1.000        70.0        76.0
  16        1.000      .900      1.000      1.000        70.0        76.0
  17        1.000      .800      1.000      1.000        70.0        76.0
  18         .200      .200       .100       .100        70.0        76.0
  19         .100      .000       .000       .000        70.0        76.0
  20         .100      .000       .000       .000        70.0        76.0
  21         .100      .000       .000       .000        70.0        76.0
  22         .100      .000       .000       .000        70.0        76.0
  23         .100      .000       .000       .000        70.0        76.0
  24         .100      .000       .000       .000        70.0        76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)     9430.000000
ECONOMIZER HIGH TEMP LIMIT F        68.000000
SYSTEM SUPPLY AIR START TIME HR     0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR        24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)       55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)     1.000000E-01
FAN EFFICIENCY (EFAN)     5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)     8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)            4
COOLING PLANT RATED OUTPUT BTU (CFLOT)   360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BLDG 625 - BATTALION HQ - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALLS

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-64.08	LOSS		-1.15	-8.93	.00	-4.49	-7.10	-73.90	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.00	.00	.00	.00
	-49.90	LOSS		-.95	-7.58	.00	-3.40	-6.05	-62.67	.00
MAR	.98	GAIN	11.72	.00	.00	.00	.04	.00	.00	.03
	-38.43	LOSS		-.84	-7.04	.00	-2.54	-5.61	-56.95	.00
APR	9.98	GAIN	11.93	.01	.04	.00	.32	.03	.26	1.65
	-14.32	LOSS		-.48	-4.19	.00	-1.08	-3.34	-31.95	.00
MAY	23.54	GAIN	13.07	.03	.14	.00	.88	.11	.87	6.43
	-1.61	LOSS		-.24	-2.50	.00	-.24	-1.92	-18.73	.00
JUN	55.05	GAIN	13.17	.09	.40	.00	1.66	.32	2.63	24.03
	.00	LOSS		-.08	-1.16	.00	.00	-.89	-7.96	.00
JUL	75.27	GAIN	13.38	.18	1.02	.00	2.36	.82	6.92	33.50
	.00	LOSS		-.05	-.72	.00	-.01	-.56	-5.30	.00
AUG	70.41	GAIN	11.73	.13	.77	.00	1.97	.60	4.99	32.64
	.00	LOSS		-.05	-.80	.00	-.01	-.61	-5.07	.00
SEP	39.47	GAIN	10.12	.05	.39	.00	1.00	.32	2.74	18.06
	-2.46	LOSS		-.21	-1.96	.00	-.28	-1.54	-14.53	.00
OCT	8.46	GAIN	8.62	.00	.06	.00	.16	.05	.38	2.57
	-11.22	LOSS		-.52	-4.04	.00	-1.29	-3.14	-29.69	.00
NOV	1.62	GAIN	6.92	.00	.00	.00	.01	.00	.00	.44
	-28.86	LOSS		-.76	-5.79	.00	-2.55	-4.52	-44.24	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.00	.00	.00	.00
	-62.22	LOSS		-1.14	-8.73	.00	-4.54	-6.87	-70.74	.00
TOT	285.	GAIN	124.	0.	3.	0.	8.	2.	19.	119.
	-273.	LOSS		-6.	-53.	0.	-20.	-42.	-422.	0.

MAX HEATING LOAD= -260667. BTUH ON DEC 18 HOUR 4 AMBIENT TEMP 1.
MAX COOLING LOAD= 283292. BTUH ON JUL 23 HOUR 14 AMBIENT TEMP 68.

ZONE UA BTU/HR-F 801.3

BLDG 625 - BATTALION HQ - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALLS

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL HEAT GAIN MILLION BTU
JAN	70.	77.		4	17	62.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	71.	76.		26	17	60.	2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	77.		12	15	72.	3.26	12.57	4.22	23.72
			69.	3	6	15.				
APR	73.	78.		24	15	81.	3.14	12.09	4.08	22.85
			70.	14	6	29.				
MAY	75.	78.		15	15	80.	3.32	12.81	4.22	24.09
			70.	11	5	39.				
JUN	76.	78.		12	14	85.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	77.	78.		13	15	91.	3.26	12.57	4.22	23.72
			73.	10	6	60.				
AUG	76.	78.		30	14	87.	3.32	12.81	4.22	24.09
			71.	25	6	51.				
SEP	75.	78.		11	14	85.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73.	78.		5	14	77.	3.32	12.81	4.22	24.09
			70.	28	6	33.				
NOV	71.	77.		8	15	76.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	75.		12	16	59.	3.20	12.33	4.22	23.35
			69.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALLS

MONTH	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED: HEATING	COOLING INCLUDING ECONOMIZER	NUMBER OF HOURS WHEN LOADS WERE NOT MET: HEATING	COOLING	MAXIMUM LOADS BTU: HEATING	COOLING
JAN	620	4	0	0	-.2552E+06	.0000
FEB	504	3	0	0	-.2062E+06	.0000
MAR	441	30	0	0	-.2090E+06	.9730E+05
APR	215	137	0	0	-.1286E+06	.1493E+06
MAY	34	297	0	0	-.8446E+05	.1777E+06
JUN	0	418	0	0	.0000	.2375E+06
JUL	0	546	0	0	.0000	.2833E+06
AUG	0	518	0	0	.0000	.2471E+06
SEP	61	330	0	0	-.8332E+05	.2301E+06
OCT	204	127	0	0	-.1220E+06	.1759E+06
NOV	397	44	0	0	-.1720E+06	.1279E+06
DEC	640	0	0	0	-.2607E+06	.0000
YEAR	3116	2454	0	0	-.2607E+06	.2833E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
MONTH	HEATING MILLION BTU	COOLING THOUSAND KWH	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FANS THOUSAND KWH	HEAT GAIN MILLION BTU	ELECTRIC DEMAND KW
JAN	92.45	.00	3.32	12.81	1.24	24.09	12.6
FEB	72.87	.00	2.95	11.38	1.12	21.47	12.6
MAR	58.16	.09	3.26	12.57	1.24	23.72	20.3
APR	23.83	.83	3.14	12.09	1.20	22.85	23.4
MAY	3.07	1.86	3.32	12.81	1.24	24.09	25.2
JUN	.00	4.10	3.14	12.09	1.20	22.85	29.6
JUL	.00	5.64	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.27	3.32	12.81	1.24	24.09	30.3
SEP	5.13	2.98	3.08	11.86	1.20	22.48	28.9
OCT	20.10	.68	3.32	12.81	1.24	24.09	25.1
NOV	46.54	.14	3.20	12.33	1.20	23.22	22.1
DEC	91.43	.00	3.20	12.33	1.24	23.35	12.6
YEAR	413.58	21.58	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 140960. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALLS

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	MAX SYSTEM TEMP. DRIFT DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HOURS WHEN SYSTEM LOADS NOT MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2552E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2062E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9730E+05	-.2090E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1493E+06	-.1286E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1777E+06	-.8446E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2375E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2833E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2471E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2301E+06	-.8332E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1759E+06	-.1220E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1279E+06	-.1720E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2607E+06

BLDG 625 - BATTALION HQ - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

---------- PROGRAM CONTROL OPTIONS ----------

COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) 0

--------- SITE AND BUILDING DATA --------------

******REAL WEATHER FROM DISK*******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE

.850	.850	.850	.850	.850	.850	.850	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	.850	.850	.850	.850	.850	.850

A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW(HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE(SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.055	.055	.055	.055
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00174	.00174	.00174	.00174
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00019	.00019	.00019	.00019
N=3	.00089	.00089	.00089	.00089
N=4	.00059	.00059	.00059	.00059
N=5	.00007	.00007	.00007	.00007
N=6	********	********	********	********
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	-.14508	-.14508	-.14508	-.14508
N=5	.00613	.00613	.00613	.00613
N=6	-.00002	-.00002	-.00002	-.00002

ROOF AREA SQFT (AROF) 5795.000000
ROOF U VALUE BTU/HR-SQFT-F (URF) 3.800000E-02
ROOF TRANS FUNCTIONS USED (1=YES, 0=NO) (IROOF) 1
ROOF C TRANSFER FUNCTION (CNR) 2.021078E-04
ROOF B TRANSFER FUNCTIONS (BNR)
.000 .186E-05 .279E-04 .922E-04 .689E-04 .130E-04
ROOF D TRANSFER FUNCTIONS (DNR)
1.00 -1.97 1.36 -.410 .534E-01 -.250E-02
SKYLIGHT TILT DEGREES (TILT) 0.000000E+00
SKYLIGHT AZIMUTH ANGLE DEGREES (AZSK) 9999.000000
SKYLIGHT HEIGHT FT (SKH) 0.000000E+00
SKYLIGHT WIDTH FT (SKW) 0.000000E+00
SKYLIGHT OVERHANG WIDTH FT (SKOW) 0.000000E+00
OVERHANG HEIGHT ABOVE SKYLIGHT FT (SKOH) 0.000000E+00
SKYLIGHT GLASS NUMBER (NS) 1
SKYLIGHT SHADING COEFFICIENT (SHSK) 0.000000E+00
SUMMER START MONTH AND DAY FOR SHSK (MST,NDST) 1 1
SUMMER END MONTH AND DAY FOR SHSK (MND,NDND) 1 1
SKY LIGHT AREA SQFT (ASKY) 0.000000E+00
DAYTIME SKY LIGHT U BTU/SQFT-HR-F (SKYU) 1.292998
NIGHT TIME SKYLIGHT U BTU/SQFT-HR-F (SKYUN) 1.292998
FRACTION OF PROCESS HEAT TO INTERNAL SPACE (FAP) 4.100000E-01

----------INTERNAL GAINS AND PROFILES ----------

	KW	- - - - - - BTU/HR - - - - - -			THERMOSTAT SET POINT DEG F	
	LIGHTS	PROCESS	PEOPLE SENSIBLE	PEOPLE LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	- - - - HOURLY FRACTION OF PEAK - - - -					
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
  9        1.000      .900     1.000     1.000        70.0       76.0
 10        1.000      .900     1.000     1.000        70.0       76.0
 11         .800      .800      .800      .800        70.0       76.0
 12         .500      .500      .400      .400        70.0       76.0
 13         .800      .800      .800      .800        70.0       76.0
 14        1.000      .900     1.000     1.000        70.0       76.0
 15        1.000      .900     1.000     1.000        70.0       76.0
 16        1.000      .900     1.000     1.000        70.0       76.0
 17        1.000      .800     1.000     1.000        70.0       76.0
 18         .200      .200      .100      .100        70.0       76.0
 19         .100      .000      .000      .000        70.0       76.0
 20         .100      .000      .000      .000        70.0       76.0
 21         .100      .000      .000      .000        70.0       76.0
 22         .100      .000      .000      .000        70.0       76.0
 23         .100      .000      .000      .000        70.0       76.0
 24         .100      .000      .000      .000        70.0       76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT)       65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)       65.000000
SYSTEM TYPE, (IECN)           2
SUPPLY AIR CFM (SACFM)    9430.000000
ECONOMIZER HIGH TEMP LIMIT F       68.000000
SYSTEM SUPPLY AIR START TIME HR    0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR       24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)      55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)    1.000000E-01
FAN EFFICIENCY (EFAN)    5.500000E-01
FAN TOTAL PRESSURE IN. WATER  (DP)    8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT)  274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN)   342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
 .100      .191      .200      .286      .300      .369      .400      .451
 .500      .537      .600      .625      .700      .718      .800      .812
 .900      .906     1.00      1.00
CHILLER TYPE (ITYPCH)           4
COOLING PLANT RATED OUTPUT BTU (CFLOT)   360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)    82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000      .000      .000      .000      .000
 .000      .000      .000      .000
```

BEACON Energy Analysis By EMC Engineers, Inc. 625RGD.I

BLDG 625 - BATTALION HQ - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH	LOAD		SOLAR THRU WINDOW	ROOF	PARTITN DOOR AND SLAB	BSMT	WALL	WINDOW	VENT AND INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-63.48	LOSS		-1.15	-8.93	.00	-3.87	-7.10	-73.92	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.00	.00	.00	.00
	-49.45	LOSS		-.95	-7.58	.00	-2.92	-6.05	-62.69	.00
MAR	.98	GAIN	11.72	.00	.00	.00	.04	.00	.00	.03
	-38.13	LOSS		-.84	-7.04	.00	-2.19	-5.61	-56.99	.00
APR	9.99	GAIN	11.93	.01	.04	.00	.29	.03	.26	1.65
	-14.22	LOSS		-.48	-4.19	.00	-.94	-3.34	-31.96	.00
MAY	23.44	GAIN	13.07	.03	.14	.00	.77	.11	.87	6.40
	-1.61	LOSS		-.24	-2.49	.00	-.22	-1.92	-18.71	.00
JUN	54.58	GAIN	13.17	.09	.40	.00	1.44	.32	2.63	23.76
	.00	LOSS		-.08	-1.15	.00	-.01	-.89	-7.93	.00
JUL	74.79	GAIN	13.38	.18	1.02	.00	2.03	.82	6.92	33.32
	.00	LOSS		-.05	-.72	.00	-.01	-.55	-5.28	.00
AUG	69.85	GAIN	11.73	.13	.77	.00	1.69	.60	4.99	32.33
	.00	LOSS		-.05	-.79	.00	-.01	-.61	-5.05	.00
SEP	39.37	GAIN	10.12	.05	.39	.00	.86	.32	2.74	18.06
	-2.45	LOSS		-.21	-1.96	.00	-.25	-1.54	-14.53	.00
OCT	8.46	GAIN	8.62	.00	.06	.00	.15	.05	.38	2.57
	-11.11	LOSS		-.52	-4.04	.00	-1.12	-3.14	-29.72	.00
NOV	1.64	GAIN	6.92	.00	.00	.00	.01	.00	.00	.44
	-28.56	LOSS		-.76	-5.79	.00	-2.19	-4.52	-44.27	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.00	.00	.00	.00
	-61.60	LOSS		-1.14	-8.73	.00	-3.90	-6.87	-70.75	.00
TOT	283.	GAIN	124.	0.	3.	0.	7.	2.	19.	119.
	-271.	LOSS		-6.	-53.	0.	-18.	-42.	-422.	0.

MAX HEATING LOAD= -259456. BTUH ON DEC 18 HOUR 4 AMBIENT TEMP 1.
MAX COOLING LOAD= 283176. BTUH ON JUL 23 HOUR 14 AMBIENT TEMP 68.

ZONE UA BTU/HR-F 771.0

BLDG 625 - BATTALION HQ - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

MONTH	INTERNAL SPACE TEMPERATURE F AVG.	MAX	MIN	DAY	HR	COIN-CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FAN HEAT MILLION BTU	TOTAL INTERNAL HEAT GAIN MILLION BTU
JAN	70.	77.		4	17	62.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	71.	76.		26	17	60.	2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	77.		12	15	72.	3.26	12.57	4.22	23.72
			69.	3	6	15.				
APR	73.	78.		24	15	81.	3.14	12.09	4.08	22.85
			70.	14	6	29.				
MAY	75.	78.		15	15	80.	3.32	12.81	4.22	24.09
			70.	11	5	39.				
JUN	76.	78.		12	14	85.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	76.	78.		13	15	91.	3.26	12.57	4.22	23.72
			72.	10	6	60.				
AUG	76.	78.		30	14	87.	3.32	12.81	4.22	24.09
			71.	25	6	51.				
SEP	75.	78.		11	14	85.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73.	78.		5	14	77.	3.32	12.81	4.22	24.09
			70.	28	5	31.				
NOV	72.	77.		8	15	76.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	75.		12	16	59.	3.20	12.33	4.22	23.35
			69.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

	NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED		NUMBER OF HOURS WHEN LOADS WERE NOT MET		MAXIMUM LOADS BTU	
MONTH	HEATING	COOLING INCLUDING ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	619	4	0	0	-.2543E+06	.0000
FEB	500	4	0	0	-.2052E+06	.0000
MAR	440	30	0	0	-.2082E+06	.9753E+05
APR	216	137	0	0	-.1281E+06	.1492E+06
MAY	34	296	0	0	-.8433E+05	.1774E+06
JUN	0	413	0	0	.0000	.2371E+06
JUL	0	543	0	0	.0000	.2832E+06
AUG	0	513	0	0	.0000	.2468E+06
SEP	61	330	0	0	-.8309E+05	.2297E+06
OCT	204	127	0	0	-.1216E+06	.1759E+06
NOV	395	44	0	0	-.1711E+06	.1281E+06
DEC	637	0	0	0	-.2595E+06	.0000
YEAR	3106	2441	0	0	-.2595E+06	.2832E+06

SYSTEM TOTALS

	ENERGY CONSUMPTION					TOTAL INTERNAL	MAXIMUM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	91.78	.00	3.32	12.81	1.24	24.09	12.6
FEB	72.20	.00	2.95	11.38	1.12	21.47	12.6
MAR	57.81	.09	3.26	12.57	1.24	23.72	20.3
APR	23.80	.83	3.14	12.09	1.20	22.85	23.4
MAY	3.07	1.85	3.32	12.81	1.24	24.09	25.2
JUN	.00	4.07	3.14	12.09	1.20	22.85	29.6
JUL	.00	5.60	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.22	3.32	12.81	1.24	24.09	30.3
SEP	5.12	2.97	3.08	11.86	1.20	22.48	28.8
OCT	20.01	.68	3.32	12.81	1.24	24.09	25.1
NOV	46.17	.14	3.20	12.33	1.20	23.22	22.1
DEC	90.64	.00	3.20	12.33	1.24	23.35	12.6
YEAR	410.60	21.45	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 140370. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEM TEMP. DRIFT DEG. F +	DEG. F -	HOURS WHEN SYSTEM LOADS NOT MET COOL	HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	-.2543E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	-.2052E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9753E+05	-.2082E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1492E+06	-.1281E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1774E+06	-.8433E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2371E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2832E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2468E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2297E+06	-.8309E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1759E+06	-.1216E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1281E+06	-.1711E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	-.2595E+06

BUILDING MANAGER INTERVIEW

BUILDING INFORMATION:						
Building No: 625	Building Name: Battalion Head Quarters					
Surveyed by: DMS	Date: 11/7/95		Building Use: Administration & Training			
Building Contact:			Phone No:			
Building Contact:			Phone No:			
OCCUPANCY:						
Number of Employees:	Mon./Fri.:	50	Schedule:	700	To	1700
	Tues./Thurs	50		700	To	1700
	Wed.	50		700	To	1700
	Sat./Sun.	3		800	To	1600
Visitors Per Day:	Mon./Fri.:		Schedule:		To	
	Tues./Thurs.				To	
	Wed.				To	
	Sat./Sun.				To	
Comments:						
LIGHTING SCHEDULE:						
Normal Occupancy:	Mon.-Fri.:		Schedule:	700	To	1700
	Sat./Sun.:			800	To	1600
Cleaning Crew/2nd Shift:	Mon.-Fri.:		Schedule:		To	
	Sat./Sun.:				To	
EQUIPMENT SCHEDULE:						
Fan/AHU Schedule:	Mon.-Fri.:		Schedule:	0	To	2400
	Sat./Sun.:			0	To	2400
Chiller Schedule:	Mon.-Fri.:		Schedule:	0	To	2400
	Sat./Sun.:			0	To	2400
Boiler Schedule:	Mon.-Fri.:		Schedule:	0	To	2400
	Sat./Sun.:			0	To	2400
Aux. Equipment Schedule:						
	Mon.-Fri.:		Schedule:	0	To	2400
	Sat./Sun.:			0	To	2400
	Mon.-Fri.:		Schedule:	0	To	2400
	Sat./Sun.:			0	To	2400
Comments:						

Building No 625 **Building Name:** Battalion Head Quarters

BUILDING ENVELOPE

EXTERIOR WALLS

Wall Direction (N, E, W, or S)	Wall Construction No.	Comments
N	XW-1	
E	XW-1	
S	XW-1	
W	XW-1	

LIST OF EXT. WALL CONSTRUCTION TYPES

Wall Construction No.	Description
XW-1	Face Brick & CMU
XW-2	Face Brick, CMU, & Gyp. Board
XW-3	Face Brick, CMU, & Ceramic Tile
XW-4	Face Brick, CMU, & Plaster Coat
XW-5	Insulated Metal Panel

WINDOWS

Window Direction (N, E, W, or S)	Window Construction No.	Comments
N	W-1	Insulated metal panel on top portion of window
E	W-1	Insulated metal panel on top portion of window
S	W-1	Insulated metal panel on top portion of window
W	W-1	Insulated metal panel on top portion of window
		Bldg. Entrance has single pane glass

LIST OF WINDOW TYPES

Window Construction No.	Description
W-1	Double Pane Clear
W-2	Double Pane Tinted
W-3	Single Pane with Storm Windows
W-4	Single Pane

ROOF CONSTRUCTION

Roof Location	Roof Construction No.	Comments
ALL	R-2	Contains two 3" layers of Batt Insulation above ceiling

LIST OF ROOF CONSTRUCTION TYPES

Roof Construction No.	Description
R-1	BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile
R-2	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Ceiling Tile
R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Clg
R-4	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plaster Clg.
R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceiling Tile
R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaster Clg.

Building No: 625 Building Name: Battalion Head Quarters

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

INTERIOR EQUIPMENT AND OBJECTS			
Wall Direction (N, E, W, or S)	Item No.	No. of Items	Comments
Admin. Area			
N	M-3	2	1 @ 16'; 1 @ 24'
N	E-2	1	
N	C-3	1	
N	E-3	1	
N	A-4	12	
E	M-3	3	2 @ 12'; 1 @ 5'
E	A-5	2	
E	A-6	1	
E	A-4	6	
S	C-3	1	
S	M-3	2	1 @ 6'; 1 @ 28'
S	A-7	1	
S	A-4	12	
Toilet Room			Glazed structural block 4'-0" A.F.F.
S	M-3	1	1 @ 6'
S	M-6	2	
S	P-3	2	
S	P-2	2	
Classroom			
S	A-8	1	
S	E-2	2	
S	E-3	1	
W	E-4	3	
W	E-2	5	
W	E-3	2	
W	M-3	2	2 @ 16'
W	L-3	2	
W	A-3	3	
W	A-4	6	
W-S-N	-	-	Wall construction: Wood paneling
			3'-0" A.F.F. along perimeter walls.

LIST OF EQUIPMENT AND OBJECTS	
Item No.	Description
	Architectural
A-1	Interior Partitions
A-2	Wall Placards
A-3	Wall-Mounted TV Sets
A-4	Drapery Rods, Venician Blinds
A-5	Shelves
A-6	Closet Door
A-7	Key Box
A-8	Pull Down Movie Screen
	Plumbing
P-1	Sinks
P-2	Commodes
P-3	Toilet Stalls
P-4	Water Fountains
	HVAC Mechanical
M-1	Floor Supply/Return Grilles
M-2	Ceiling Supply/Return Grilles
M-3	Finned-Tube Baseboard Radiators
M-4	Thermostats / Space Temp. Sensors
M-5	Wall mounted convection type heater
M-6	1/2" Hot & Cold Water Piping
	Electrical
E-1	Electrical Panels
E-2	Electrical Outlets
E-3	Electrical Light Switches
E-4	Wall Mounted Television
	Lighting
L-1	Wall Mounted Fixtures
L-2	Ceiling Mounted Fixtures
L-3	Exit Signs
	Fire Protection
F-1	Alarm Pull Switches
F-2	Alarm Sound Devices (Speakers, Bells)
F-3	Sprinkler Heads
F-4	Fire Extinguishes
	Communication
C-1	Telephones - Wall Mounted
C-2	Telephones - Booth Mounted
C-3	Telephone Jacks

Building No: 631 **Building Name:** Battalion Head Quarters

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

INTERIOR EQUIPMENT AND OBJECTS				LIST OF EQUIPMENT AND OBJECTS	
Wall Direction (N, E, W, or S)	Item No.	No. of Items	Comments	Item No.	Description
					Architectural
Admin. Area				A-1	Interior Partitions
N	M-3	2	1 @ 16'; 1 @ 24'	A-2	Wall Placards
N	E-2	1		A-3	Drapery Valances
N	C-3	1		A-4	Drapery Rods
N	E-3	1		A-5	Shelves
N	A-4	12		A-6	Closet Door
				A-7	Key Box
E	M-3	3	2 @ 12'; 1 @ 5'	A-8	Pull Down Movie Screen
E	A-5	2			**Plumbing**
E	A-6	1		P-1	Sinks
E	A-4	6		P-2	Commodes
				P-3	Toilet Stalls
S	C-3	1		P-4	Water Fountains
S	M-3	2	1 @ 6'; 1 @ 28'		**HVAC Mechanical**
S	A-7	1		M-1	Floor Supply/Return Grilles
S	A-4	12		M-2	Ceiling Supply/Return Grilles
				M-3	Finned-Tube Baseboard Radiators
Toilet Room			Glazed structural block 4'-0" A.F.F.	M-4	Thermostats / Space Temp. Sensors
S	M-3	1	1 @ 6'	M-5	Wall mounted convection type heater
S	M-6	2		M-6	1/2" Hot & Cold Water Piping
S	P-3	2			
S	P-2	2			**Electrical**
				E-1	Electrical Panels
				E-2	Electrical Outlets
Computer Center				E-3	Electrical Light Switches
S - N		2	Halon Fire Suppression System	E-4	Wall Mounted Television
N	E-1	1			
N		1	Small A.C. Unit		
					Lighting
W	F-1	2		L-1	Wall Mounted Fixtures
W	E-3	3		L-2	Ceiling Mounted Fixtures
W	E-4	2	2 @ 16'	L-3	Exit Signs
W	F-4	2			
W	E-2	3			
W	L-3	1			**Fire Protection**
W			12' of Electrical Conduit	F-1	Alarm Pull Switches
				F-2	Alarm Sound Devices (Speakers, Bells)
				F-3	Sprinkler Heads
				F-4	Fire Extinguishes
					Communication
				C-1	Telephones - Wall Mounted
				C-2	Telephones - Booth Mounted
				C-3	Telephone Jacks

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
BLDG: **625**
FILE: **625AH1**

AIR HANDLING UNIT SURVEY OBSERVATIONS

AHU-1	AHU NO.	**MECH. RM.**	LOCATION (RM)
ACCU-1	REF. SYS. SERVING AHU	**ALL**	SERVES AREA

UNIT TYPE:

	SINGLE ZN		2-PIPE FC		4-PIPE FC		UNIT HTR		H&V
X	MULTIZONE		DOUBLE DT		REHEAT		INDUCTION		VAV
5	NUMBER OF ZONES				OTHER				
	COMMENT:								

NAMEPLATE:

WORTHINGTON					MFG.	**CM-18.00**			MODEL
7.5	SUPPLY FAN HP		**DAYTON**		MFG.	**2N985G**			MODEL
	RET/EXH FAN HP				MFG.				MODEL
9430	CFM-HTG	**9430**	CFM-CLG	**17%**	MIN %OA	**100%**	MAX %OA	**73.5%**	% HTG AREA SERVED
COMMENT:									

COILS:

X	NONE		STM		HW		ELEC		MOD VLV	PREHEAT
	NONE		STM	X	HW		ELEC	X	MOD VLV	HEATING
X	NONE		STM		HW		ELEC		MOD VLV	REHEAT
X	NONE		STM		HW		EVAP MEDIA		MOD VLV	HUMID.
	NONE	X	DX		CW			X	MOD VLV	COOLING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENTS
PRESENT START TIME	800	700	700	700	700	700	800	TIMECLOCK?
PRESENT STOP TIME	1600	1700	1700	1700	1700	1700	1600	YES
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	1	1	1	1	1	1	1	1

CONTROLS:

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK		**DAMPERS CONNECTED**	
SPACE SETPOINT (oF):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	**& WORKING**
OTHER SETPOINTS (oF):	**N/A**	HOT DECK	**N/A**	COLD DECK	**N/A**	MIXED AIR		OTHER	
DAMPER CONTROL:	**N**	MIN OA (Y/N)	**Y**	MAX OA (Y/N)	**Y**	RA (Y/N)	**N**	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:	**Y**	YES		NO					
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD
BLDG: **625**

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
FILE: **625CH1**

REFRIGERATION EQUIPMENT SURVEY OBSERVATIONS

ACCU-1	CHILLER/COMPRESSOR NO.	OUTSIDE MECH. RM.	LOCATION (RM)

UNIT TYPE:

	CENTRIFUGAL WITH WATER SIDE COOLING TOWER						OTHER
	RECIPROCATING WITH WATER SIDE COOLING TOWER					AHU-1	AHU'S SERVED
	RECIPROCATING WITH AIR COOLED CONDENSING UNIT						
	ABSORBTION WITH WATER SIDE COOLING TOWER						
X	AIR COOLED CONDENSING UNIT						
	CHW	X	DX		OTHER		

NAMEPLATE:

CHILLER	EATHER KIN	MFG.	4172-2-40B			MODEL	18211203541			SERIAL NO.
230	VOLTS	140	AMPS	3	PH	60	HZ		CAPACITY (TONS)	
TOWER		MFG.				MODEL			2	# OF FANS
230	VOLTS	8.4	AMPS	3	PH	60	HZ	3	HP each	
CW PUMP		MFG.				MODEL				SERIAL NO.
	VOLTS		AMPS		PH		HZ		HP	
CNW PUMP		MFG.				MODEL				SERIAL NO.
	VOLTS		AMPS		PH		HZ		HP	
COMMENTS:										

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	800	700	700	700	700	700	800	TIMECLOCK?
PRESENT STOP TIME	1600	1700	1700	1700	1700	1700	1600	YES
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
0	0	0	0	1	1	1	1	1	0	0	0

CONTROLS:

		PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		CWS (oF)		CWR (oF)		CNWS (oF)		CNWR (oF)	
PANEL INDICATORS									
- PRESSURE		LITE-HI		LITE-LOW		GAUGES			
- TEMPERATURE		LITE-HI		LITE-LOW		GAUGES			
- OTHER									
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
BLDG: **625**
FILE: **625RD1**

PERIMETER RADIATION SURVEY OBSERVATIONS

RAD-1	PER RAD NO.	**MECH. RM.**	LOCATION (RM)
CV-1	SOURCE OF HEATING	**ALL**	SERVES AREA

UNIT TYPE:

	STEAM	X	HW		ELECTRIC				
	OTHER								
	COMMENT:								

NAMEPLATE:

	HW PUMP 1 - HP		MFG.		MODEL
	HW PUMP 2 - HP		MFG.		MODEL
	HW PUMP 3 - HP		MFG.		MODEL
	HW PUMP 4 - HP		MFG.		MODEL
COMMENT:				**26.5%**	% AREA HEATING

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	**0**	**0**	**0**	**0**	**0**	**0**	**0**	TIMECLOCK?
PRESENT STOP TIME	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**NO**
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**

CONTROLS:

		PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
RADIATION CONTROL:	X	NONE		2-WAY VLV		3-WAY VLV		OTHER	
SPACE SETPOINT (oF):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
RESET CONTROL (oF):		HW HIGH		HW LOW		OA LOW		OA HIGH	
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS
CLIENT CONTRACT NO.: DACA 01-94D-0033
LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011
DATE: Feb-96
PREPARED BY: **DMS**
CHECKED BY: AJN
BLDG: **625**
FILE: **625CV1**

BOILER & CONVERTER SURVEY OBSERVATIONS

CV-1	BOILER/CONVERTER NO.	**MECH. RM.**	LOCATION (RM)
C.P.	SOURCE OF HEATING (PLANT)	**ALL**	SERVES AREA

UNIT TYPE:

	STEAM		PSIG		HW		TEMP.	BOILER TYPE:
	NO.2 OIL		NO.6 OIL		N.GAS		ELEC	FUELS:
X	STM/HW		HTHW/HW		HTHW/STM		OTHER	CONVERTER TYPE:
X	SPACE HEAT		DHW		OTHER			USE:
COMMENT:								% HTG AREA SERVED
								BB RADIATION ONLY

NAMEPLATE:

N/A	MFG.	**N/A**	MODEL	**290000**	CAPACITY OUTPUT (BTUH)
				305263	CAPACITY INPUT (BTUH)
	MFG.		MODEL		CAPACITY OUTPUT (BTUH)
					CAPACITY INPUT (BTUH)
0.75	HW PUMP 1 - HP	**DUNHAM-BUSH**	MFG.	**1A5C431-2**	MODEL
	HW PUMP 2 - HP		MFG.		MODEL
	HW PUMP 3 - HP		MFG.		MODEL
COMMENT:					

OPERATION:

HOURS ON:	S	M	T	W	T	F	S	COMMENT
PRESENT START TIME	**0**	**0**	**0**	**0**	**0**	**0**	**0**	TIMECLOCK?
PRESENT STOP TIME	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**2400**	**NO**
REQUIRED START TIME								
REQUIRED STOP TIME								

MONTHS ON:

J	F	M	A	M	J	J	A	S	O	N	D
1	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**

CONTROLS:

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		PSIG	**N/A**	HW SUPPLY					
RESET CONTROL (oF):		HW HIGH		HW LOW		OA LOW		OA HIGH	
BURNER CONTROLS		O2 TRIM (Y/N)		OTHER					
COMMENTS:									